APPENDIX 1

Table A-1. No Effect/Impact Rationale for Endangered, Threatened and Sensitive Aquatic Species

Species	Status within the Analysis Area	Rationale for No Effect Determination
White sturgeon (*Acipenser transmontanus*)	Endangered, Not Suspected	The Young Dodge Analysis Area is located approximately 35 stream miles above Libby Dam and approximately 65 stream miles above Kootenai Falls, where current suitable sturgeon habitat occurs. Risk of downstream effects on the white sturgeon is immeasurably low due to the lack of a physical or biological connection between proposed activities and known or suspected populations. USFWS in 2001 granted concurrence that projects above Libby Dam would have no effect to sturgeon (Wilson 2001).
Redband trout (*Oncorhynchus mykiss*)	Sensitive, Not Suspected	Interior redband trout populations of 98 percent or better purity only inhabit tributaries to the Kootenai River below Kootenai Falls, which is the species' historic range. Risk of downstream effects on redband trout populations is immeasurably low due to the lack of a physical or biological connection between proposed activities and known or suspected populations.
Western pearlshell mussel (*Margaritifera falcata)*	Sensitive, Not Suspected	No western pearlshell have been documented in the Analysis Area during intensive aquatic surveys.

Table A-2. No Impact Rationale for Sensitive Wildlife Species

Species	Status within the Analysis Area	Rationale for No Effect Determination
Coeur d'Alene salamander (*Plethodon vandykei idahoensis*)	Sensitive, Not suspected	There is no habitat in the form of rock walls with seeping water or spray zones. Therefore, this project would have no effect on the salamander or its habitat.
Common Loon (*Gavia immer*)	Sensitive, Not suspected	No foraging or nesting habitat exists in the form of large lakes within the Analysis Area. Therefore, this project would have no effect on the common loon or its habitat.
Harlequin duck (*Histrionicus histrionicus*)	Sensitive, Not suspected	Harlequin ducks require clean, clear water with an abundant food source for successful reproduction. This duck is not known to use Young or Dodge Creeks or tributaries and locations on the northern KNF are known only to Grave Creek. Therefore this project would have no effect on the harlequin duck or its habitat
Northern bog lemming (*Synaptomys borealis*)	Sensitive, Not suspected	The Analysis Area supports few areas of thick mats of sphagnum moss in bogs, fens, or other wet areas suitable for the bog lemming. Surveys in the Analysis Area have not found this species. Therefore, this project would have no effect on the bog lemming or its habitat.
Northern Leopard Frog (*Rana pipiens*)	Sensitive, Not suspected	Only known location on District is on the east side of Koocanusa Reservoir.
Peregrine Falcon (*Falco peregrinus*)	Sensitive, Not suspected	Suitable habitat does not occur in the Analysis Area.
Bighorn Sheep (Ovis canadensis)	Sensitive Not Suspected	Suitable habitat does not occur in the Analysis Area.

APPENDIX 2

INTRODUCTION

Federal agency compliance with pollution control is addressed through Section 313 of the Clean Water Act, Executive Order 12580 (January 23, 1987), National Nonpoint Source Policy (December 12, 1984), USDA Nonpoint Source Water Quality Policy (December 5, 1986) and the Environmental Protection Agency in their guidance "Nonpoint Source Controls and Water Quality Standards" (August 19, 1987). In order to comply with State and local non-point pollution controls the Forest Service will apply Best Management Practices (BMPs) to all possible non-point sources which may result from management activities proposed in this DEIS. These BMPs are the Soil and Water Conservation Practices described in the Forest Service Handbook (FSH) 2509.22.

BMPs are the primary mechanism for achievement of water quality standards (EPA, 1987). This appendix describes the Forest Service's BMP process in detail, and lists the key Soil and Water Conservation Practices that have been selected to be used in the action alternatives analyzed in this DEIS.

BMPs include, but are not limited to, structural, and non-structural controls, operations, and maintenance procedures. BMPs can be applied before, during, or after potential pollution-producing activities to reduce or eliminate the introduction of pollutants into the receiving watershed (40 CFR 130.2, EPA Water Quality Standards Regulation). BMPs are usually applied as a system of practices rather than a single practice. They are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

The Forest Plan states that soil and water conservation practices, as outlined in the Soil and Water Conservation Practices Handbook (FSH 2509.22, May 1988), will be incorporated into all land use project plans as a principal mechanism for controlling non-point pollution sources, meeting soil and water quality goals, and protecting beneficial uses. Activities found not to comply with the soil and water conservation practices or State standards will be brought into compliance, modified, or stopped (USDA Forest Service, 1987a, pp. 11-23). Montana State Water Quality Standards require the use of reasonable land, soil, and water conservation practices (analogous to BMPs) as the controlling mechanism for non-point pollution. The use of BMPs is also required in the Memorandum of Understanding between the Forest Service and the State of Montana as part of the agency's responsibility as the designated water quality management agency on National Forest System lands.

BMP IMPLEMENTATION PROCESS

In cooperation with the State, the Forest Service's primary strategy for the control of non-point sources of pollution is based on the implementation of preventive practices (i.e., BMPs). The BMPs have been designed and selected to protect the identified beneficial uses of the watershed.

The Forest Service non-point source management system consists of the following steps:

1) *BMP Selection and Design* - Water quality goals are identified in the Forest Plan. These goals meet or exceed applicable legal requirements including State water quality regulations, the Clean Water Act, and the National Forest Management Act. Environmental assessments for projects are tiered to Forest Plans using the National Environmental Policy Act process. The appropriate BMPs are selected for each project by an interdisciplinary team. In each new location, there is flexibility to design different BMPs depending on local conditions and values and downstream beneficial uses of water. The BMP selection and design are dictated by the proposed activity, water quality objectives, soils, topography, geology, vegetation, and climate. Environmental impacts and water quality protection options are evaluated, and alternative mixes of practices are

considered. A final collection of practices are selected that not only protect water quality but meet other resource needs. These final selected practices constitute the BMPs for the project.

2) *BMP Application* - The BMPs are translated into contract provisions, special use permit requirements, project plan specifications, and so forth. This insures that the operator or person responsible for applying the BMPs actually is required to do so. Site-specific BMP prescriptions are taken from plan-to-ground by a combination of project layout and resource specialists (hydrology, fisheries, soils, etc.). This is when final adjustments to fit BMP prescriptions to the site are made.

3) *BMP Monitoring* - When the resource activity begins (e.g., timber harvest or road building), timber sale administrators, engineering representatives, resource specialists, and others insure the BMPs are implemented according to plan. BMP implementation monitoring is done before, during, and after resource activity implementation. This monitoring answers the question: Did we do what we said we were going to do? Once BMPs have been implemented, further monitoring is done to evaluate if the BMPs are effective in meeting management objectives and protecting beneficial uses. If monitoring indicates that water quality standards are not being met or beneficial uses are not being protected, corrective action will consider the following:

    a. Is the BMP technically sound? Is it really best or is there a better practice that is technically sound and feasible to implement?

    b. Was the BMP applied entirely as designated? Was it only partially implemented? Were personnel, equipment, funds, or training lacking which resulted in inadequate or incomplete implementation?

    c. Do the parameters and criteria that constitute water quality standards adequately reflect human-induced changes to water quality and beneficial uses?

4) *Feedback* - Feedback on the results of BMP evaluation is both short- and long-term in nature. Where corrective action is needed, immediate response will be undertaken. This action may include: modification of the BMP, modification of the activity, ceasing the activity, or possibly modification of the State water quality standard. Cumulative effects over the long-term may also lead to the need for possible corrective actions.

KNF BMP SELECTION AND DESIGN FORM (KNF-BMP-1) (Revised 3/06)

SITE-SPECIFIC BEST MANAGEMENT PRACTICES.

Description of the soil and water conservation practices from the Forest Service Soil and Water Conservation Handbook (FSH 2509.22) will be applied in all alternatives. The location where the practices will be applied is specified in the table below. For a more detailed description of a specific BMP, refer to the Soil and Water Conservation Handbook.

Abbreviations used in this table:

SPS = Special Project Specification
TSC = Timber Sale Contract
TSA = Timber Sale Administrator
SMZ = Streamside Management Zone
IDT = Interdisciplinary Team
SWCP = Soil and Water Conservation Practice
KNF = Kootenai National Forest
PSF = Pre-sale Forester
ER = Engineering Representative
COR = Contracting Officer's Representative
SAM = Sale Area Map
FMO = Fire Management Officer

SWCP	SWCP OBJECTIVE	PERCENT EFFECTIVE	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
14.01	TIMBER SALE PLANNING - To incorporate soil and water resource considerations into Timber Sale Planning	94%	1. Unit design, mitigation, and effects analysis was done by IDT. 2. TSC will be prepared by PSF that will include management constraints and Design Criteria from EIS. 3. Use standard interim RHCA widths unless modified through watershed analysis. 4. Use exiting skid trails where feasible.	IDT has evaluated watershed characteristics and estimated response to proposed activities. EIS identifies design criteria to protect soil and water resources. Timber sale contracts will include provisions to meet water quality, soils, and other resources as directed by the Decision.	IDT; PSF	N/A
14.02	TIMBER HARVEST UNIT DESIGN - To insure that timber harvest unit design will secure favorable conditions of water flow, maintain water quality and soil productivity, and reduce soil erosion and sedimentation.	93%	1. Cumulative effects analysis and unit design were performed by IDT. 2. The prescriptions and unit design are consistent with direction outlined in the considerations for Best Management Practices. 3. Use standard interim RHCA widths unless modified through watershed analysis. 4. Use exiting skid trails where feasible.	Proposed activities were evaluated to estimate the potential watershed response. Prescriptions will be designed to assure an acceptable level of protection for soil and water resources. Management will protect soil/water values by avoiding sensitive areas, adjusting unit boundaries, adding specific BMPs to meet specific SWCPs, implementing the KNF Riparian Area Guidelines, applying mitigation, and applying implementation/effectiveness monitoring.	IDT	N/A

SWCP	SWCP OBJECTIVE	PERCENT EFFECTIVE	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
14.03	USE OF SALE AREA MAPS (SAMs) FOR DESIGNATING SOIL AND WATER PROTECTION NEEDS - To delineate the location of protected areas and available water sources and insure their recognition, proper consideration, and protection on the ground.	91%	1. Water courses identified and protected using SMZ buffers as a minimum. 2. Skidding on dry, frozen, or snow-covered soil conditions. 3. Designated skid trails in units with previous harvest. 4. Use standard interim RHCA widths unless modified through watershed analysis.	The IDT will identify water courses to be protected, unit boundaries, and other features required by other means such as "C" provisions. Ground verification and preparation of SAMs to be inclnded in TSC will be done by PSF. TSA reviews areas of concern with purchaser before operations.	IDT; PSF; TSA	B(T)1.1 B(T)6.5 C(T)6.50#
14.04	LIMITING THE OPERATION PERIOD OF TIMBER SALE ACTIVITIES - To minimize soil erosion, sedimentation, and a loss in soil productivity by insuring that the purchaser conducts his/her operations in a timely manner.	98%	1. Units located on soils sensitive to compaction and/or displacement have been identified. 2. Designate units needing harvest on frozen or snow covered ground. 3. All other ground disturbing activities will occur during dry, frozen, or snow-covered conditions.	If limited operating periods are identified and recommended during the analysis by the IDT, the PSF will prepare a contract that includes provision C(T)6.316 and/or C(T)6.4#.	IDT; PSF; TSA	B(T)6.31 B(T)6.311 B(T)6.6 C(T)6.6 C(T)6.316# C(T)6.4#
14.05	PROTECTION OF UNSTABLE AREAS - To protect unstable areas and avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.	96%	1. Unstable landtypes will be identified during the planning process. 2. Units found to need further protection will use alternative yarding techniques, seasonal restrictions, and/or unit boundary adjustments.	If the NEPA analysis concluded that soils/geology in the area were unstable, BMPs would be designed to prevent irreversible soil and water damage.	IDT; PSF; TSA	C(T)6.4#
14.06	RIPARIAN AREA DESIGNATION - To minimize the adverse effects on riparian areas with prescriptions that manage nearby logging and related land disturbance activities.	88%	1. Identify areas with or adjacent to wet areas. 2. Default RHCA widths will be adhered to unless modified through watershed analysis. 3. SMZ widths will be used as a minimum if modification is proposed. 4. Areas found during sale layout will be reported to the Hydrologist and afforded the same protections as those identified during the planning process.	All streams and wetlands in the decision area will comply with KNF Riparian Area Guidelines (Appendix 26) and KNF Forest Plan as amended by INFS/UCRB. The width of the riparian areas will be decided upon by the IDT. These widths will be included on the sale area map and marked on the ground. This information will be included in the timber sale contract.	IDT; PSF; TSA	B(T)1.1 B(T)6.5, C(T)6.4# C(T)6.41# C(T)6.50#
14.07	DETERMINING TRACTOR-LOGGABLE GROUND - To protect water quality from degradation caused by tractor logging ground disturbance.	96%	1. Tractor loggable units (slopes < 40%) have been identified during the planning process. 2. Those areas found not to be tractor loggable were designated as cable, forwarder, or winter harvest units; or were dropped form the unit.	IDT has identified tractor-loggable ground (in conjunction with personnel from timber operations) during transportation and timber sale planning process. The results have been used to determine intensity of and restrictions for land disturbance activities. PSF will prepare a TSC that includes provisions stating areas and conditions under which tractors can operate.	IDT; PSF	C(T)6.4# SAM
14.08	TRACTOR SKIDDING DESIGN - To minimize erosion and sedimentation and protect soil productivity by designing skidding patterns to best fit the terrain.	97%	1. Identify units with designated or dispersed skid trails. 2. TSA and purchaser agree on proposed locations before operation.	IDT has identified sensitive areas during the planning process. The TSA will execute the plan on the ground by locating the skid trails with the timber purchaser or by agreeing to the purchaser's proposed locations prior to operation.	IDT; TSA	B(T)6.422 C(T)6.4#
14.09	SUSPENDED LOG YARDING IN TIMBER HARVESTING - To protect the soil from excessive disturbance and accelerated erosion and maintain the integrity of the riparian areas and other sensitive areas.	95%.	1. Units that have slopes that are unsuitable for or sensitive to ground base skidding will be identified. Units 26, 29, 116, 129, and portions of 19 and 38. 2. Units with sustained slopes >40% will be designated cable harvest units.	IDT recognizes the hazards associated with operating on steep and/or rocky slopes. Areas found to be of concern will use appropriate harvest systems that provide for a safe work environment and protect natural resources.	IDT	B(T)6.42 C(T)6.4# C(T)6.50#

SWCP	SWCP OBJECTIVE	PERCENT EFFECTIVE	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
14.10	LOG LANDING LOCATION AND DESIGN - To locate in such a way as to avoid soil erosion and water quality degradation.	99%	1. TSA and purchaser agree on landing locations before operation. 2. Use least excavation needed. 3. No side-cast material into sensitive areas or waterways. 4. Install proper drainage.	TSA must agree to landing locations proposed by the purchaser. Approved landing locations will meet the criteria of: minimal size, least excavation needed, minimum skid roads necessary, no side-cast material into sensitive areas, and have proper drainage.	TSA	B(T)6.422 C(T)6.422
14.11	LOG LANDING EROSION PREVENTION AND CONTROL- To reduce erosion and subsequent sedimentation from log landing through the use of mitigating measures.	98%	1. Proper drainage will be installed and maintained during operation. 2. Landings will be scarified, seeded, and fertilized upon completion harvest activities. 3. TSA will assess conditions and take necessary steps to insure soil and water protection.	PSF and TSA assess what is necessary to prevent erosion from landing and to insure stabilization. It is up to the TSA to request technical assistance as needed.	PSF; TSA	C(T)6.6 BT6.64 B(T)6.6 C(T)6.633#
14.12	EROSION PREVENTION AND CONTROL MEASURES DURING THE TIMBER SALE OPERATION - To insure that the purchaser's operations shall be conducted reasonably to minimize soil erosion.	91%	1. Designate units with seasonal restrictions. 2. Do not operate during wet periods including spring-snowmelt and/or intense or long-duration rain storms. 3. TSA insures that erosion control is kept current and prevents operation when excessive impacts are possible.	PSF and TSA sets purchaser's responsibility to prevent soil/water resource damage in TSC. TSA insures that erosion control is kept current and prevents operation when excessive impacts are possible.	PSF; TSA	A13 B(T)6.6 B(T)6.64 C(T)6.6 C(T)6.601# C(T)6.633#
14.13	SPECIAL EROSION PREVENTION MEASURES ON AREAS DISTURBED BY HARVEST ACTIVITIES - To prevent erosion and sedimentation on disturbed areas.	91%	1. Waterbar, seed, fertilize, and place woody debris on skid trails, landings. 2. Recontour, seed, and place woody debris on constructed skid trails and temporary roads. 3. BMPs may be adjusted by the TSA to meet operational requirements	IDT identifies locations needing special stabilization measures. If any such areas are identified, BMPs may be adjusted by the TSA to meet operational requirements	IDT	C(T)6.601# C(T)6.32# C(T)6.633#
14.14	REVEGETATION OF AREAS DISTURBED BY HARVEST ACTIVITIES - To establish a vegetative cover on disturbed areas to prevent erosion and sedimentation.	94%	1. Seed and fertilize areas of exposed soil with KNF approved vegetative and fertilizer mix.	IDT has established vegetation and fertilizer mix to be used in the project area with outlines on the extent to which it should be used. TSA is responsible for seeing that revegetation work required by purchaser is done correctly and in a timely manner. The purchaser will be responsible for revegetation immediately after the completion of harvest. Funds will be collected for the District to do follow-up seeding/fertilizing in years two and three after harvest.	IDT; TSA	C(T)6.01# C(T)6.633#
14.15	EROSION CONTROL ON SKID TRAILS - To protect water quality by minimizing erosion and sedimentation derived from skid trails.	87%	1. Insure proper skid trail location. 2. Insure proper drainage on skid trails. 3. Recontour, seed, and place woody debris on constructed skid trails and temporary roads. 4. Insure maintenance of erosion control structures by purchaser.	Erosion control measures may be recommended by the IDT, but site-specifically adjusted by the TSA. TSA will insure erosion control measures are applied prior to expected hydrologic events (spring runoff, high-intensity storms, etc.). Maintenance of erosion control structures by the purchaser may be necessary and requested by the TSA.	TSA	C(T)6.6 C(T)6.633# B(T)6.6 B(T)6.65 B(T)6.66

SWCP	SWCP OBJECTIVE	PERCENT EFFECTIVE	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
14.16	WET MEADOW PROTECTION DURING TIMBER HARVESTING - To avoid damage to the ground cover, soil, and water in meadows.	84%	1. Identify units with or adjacent to wet meadows. Units 9, 10, 12, 17, 23, 52, 120, and 212 have wet meadows, wetlands, and/or ponds in or adjacent to their boundaries. 2. Units with unmapped wet areas will be reported to Hydrologist and afforded the same protection as those identified during the planning process. 3. Standard interim RHCA widths will be adhered to unless modification is in place. 4. The SMZ law will be met or exceeded.	IDT has identified areas needing special protection. PSF will verify the areas needing protection and prepare the contract to prevent damage to meadows. The TSA will be responsible for on-the-ground protection of meadows. If meadows are found by the TSA during operations, it is their responsibility to either afford them the proper protection or pursue a contract modification.	IDT; PSF; TSA	B(T)1.1 B(T)5.1 B(T)6.422 B(T)6.61 C(T)6.4# C(T)6.62#
14.17	STREAM CHANNEL PROTECTION (IMPLEMENTATION AND ENFORCEMENT) - Protect natural stream flows; provide unobstructed passage of flows; reduce sediment input; and restore flow if diverted by timber sale activity.	91%	1. Standard interim RHCA widths will be adhered to unless modification is in place. 2. SMZ widths will be used at a minimum if modification in place. 3. SMZ law will be met or exceeded.	IDT has identified the location of channels in the decision area. PSF will prepare a SAM locating the channels needing protection. Layout crew marks boundaries and trees according to HB-731 and FP guidelines. TSA will see that TSC items are carried out on the gronnd. Technical assistance will be consulted as needed.	IDT; PSF; TSA	B(T)1.1 B(T)6.5 B(T)6.6 C(T)6.50# C(T)6.6
14.18	EROSION CONTROL STRUCTURE MAINTENANCE - To insure that constructed erosion control structures are stabilized and working effectively.	93%	1. During the period of the TSC, the purchaser is responsible for maintaining their erosion control features.	During the period of the TSC, the purchaser is responsible for maintaining their erosion control features. If work is needed beyond this time, the District will pursue other sources of funding.	IDT; PSF; TSA	B(T)6.66 B(T)6.67
14.19	ACCEPTANCE OF TIMBER SALE EROSION CONTROL MEASURES BEFORE SALE CLOSURE - To assure the adequacy of required erosion control work on timber sales.	97%	1. TSA reviews erosion prevention work before each harvest unit is considered complete. 2. The inspection will determine if the work is acceptable and will meet the objective of the erosion control feature.	A careful review of erosion prevention work will be made by the TSA before each harvest unit is considered complete. The inspection will determine if the work is acceptable and will meet the objective of the erosion control feature. A feature is considered not acceptable if it does not meet standards or is not expected to protect soil/water values. Technical assistance will be used as necessary.	TSA	B(T)6.36
14.20	SLASH TREATMENT IN SENSITIVE AREAS - To protect water quality by protecting sensitive tributary areas from degradation that would result from using mechanized equipment for slash disposal.	92%	1. Where harvest is proposed within riparian areas, either slash should be removed with the tree or scattered and not treated. 2. Mechanical fuels treatments should occur on slopes < 40%.	All activities will comply with the KNF Riparian Area Guidelines (FP, Appendix 26). Where harvest within riparian areas is proposed, either the slash would be removed with the tree or scattered and not treated.	TSA; FMO	B(T)6.5 C(T)6.50# B(T)6.7 C(T)6.7 C(T)6.71 C(T)6.753
14.22	MODIFICATION OF THE TSC - To modify the TSC if new circumstances or conditions indicate the timber sale will cause irreversible damage to soil, water, or watershed values.	100%	1. Environmental modification procedure.	If TSC is not adequate to protect soil/water resources, the TSA and Contracting Officer are responsible for recommending modification of the TSC.	TSA	B(T)8.33
15.01	GENERAL GUIDELINES FOR TRANSPORTATION PLANNING - To introduce soil and water resource considerations into transportation planning.	100%	1. Complete a roads analysis. 2. Transportation plans include installation and maintaining proper drainage.	A roads Analysis has been completed. The IDT has evaluated watershed characteristics and estimated the response of soil and water resources to proposed transportation alternatives and activities.	IDT; ER	N/A

SWCP	SWCP OBJECTIVE	PERCENT EFFECTIVE	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
15.02	GENERAL GUIDELINES FOR THE LOCATION AND DESIGN OF ROADS AND TRAILS - To locate and design roads and trails with minimal soil and water impact while considering all design criteria.	96%	1. Follow INFS Standards and Guidelines for road management. 2. Identify sensitive landtypes, riparian areas, and wetlands during planning. 3. Use the minimum amount of roads and trails necessary.	The IDT has insured that the location and design of roads and trails are based on multiple resource objectives. Mitigation measures have been designed to protect the soil and water resources identified in the NEPA process. Contract provisions will be prepared by the ER that meets the soil and water resource protection requirements.	IDT; ER	N/A
15.03	ROAD AND TRAIL EROSION CONTROL PLAN - To prevent, limit, and mitigate erosion, sedimentation, and resulting water quality degradation prior to the initiation of construction by timely implementation of erosion control practices.	95%	1. Seed and fertilize disturbed areas. 2. Install proper ditching and road slope. 3. Install proper drainage. 4. Incorporate road grade breaks. 5. Use minimum road or trail length/width necessary. 6. Avoid wet areas or areas of sensitive soil types.	IDT has established soil/water conservation objectives and mitigation measures. ER will then prepare a contract that reflects the objectives. ER will see that erosion control measures are approved and completed in a timely manner. IDT reviews projects to check effectiveness of erosion control features.	IDT; ER	B(T)6.31 B(T)6.6 B(T)6.312
15.04	TIMING OF CONSTRUCTION ACTIVITIES - To minimize erosion by conducting operations during minimal runoff periods.	97%	1. Avoid construction during wet periods.	IDT has outlined detailed erosion control measures in NEPA process. ER puts these measures into contract provisions. Compliance is assured by Contracting Officer or ER.	IDT; ER	B(T)6.31 B(T)6.312 B(T)6.6 SPS 204
15.05	SLOPE STABILIZATION AND PREVENTION OF MASS FAILURES - To reduce sedimentation by minimizing the chances for road-related mass failures, including landslides and embankment slumps.	99%	1. Avoid construction across unstable areas. 2. Construct embankments following approved engineering practices. 3. Use minimum road or trail length/width necessary.	Road and trail construction in mountainous terrain requires cutting and loading natural slopes which may lead to landslides and/or embankment failures. In areas with intrinsic slope stability problems, appropriate technical resource personnel must be involved in an interdisciplinary approach to route location.	IDT; ER	N/A
15.06	MITIGATION OF SURFACE EROSION AND STABILIZATION OF SLOPES - To minimize soil erosion from road cutslopes, fill slopes, and travel ways.	94%	1. Seed and fertilize cut and fill slopes. 2. Install proper ditching and road slope. 3. Install proper drainage. 4. Incorporate road grade breaks. 5. Install ditch relief culverts before/after stream crossings.	IDT has outlined detailed erosion control measures in the NEPA process. Stabilization techniques are included in contract provisions. Compliance is assured by Contracting Officer or ER.	IDT; ER	SPS 203, 204, 206A 210, 412 619, 625, 626 630 B(T)5.3, B(T)6.31 B(T)6.6, B(T)6.62 B(T)6.66 B(T)6.312, C(T)6.6 C(T)6.601#
15.07	CONTROL OF PERMANENT ROAD DRAINAGE - To minimize the erosive effects of concentrated water and degradation of water quality by proper design and construction of road drainage systems and drainage control structures.	94%	1. Avoid long, steep grades. 2. Maintain adequate surface drainage. 3. Prevent erosion of culvert fills. 4. Maintain ditches. 5. Ditch relief culverts before/after stream crossings.	IDT has identified locations, design criteria, drainage control features, and mitigation. Compliance will be assured by the ER/Contracting Officer.	ER	B(T)5.3 C(T)5.31# B(T)6.311 B(T)6.6 C(T)6.6
15.08	PIONEER ROAD CONSTRUCTION - To minimize sediment production and mass wasting associated with pioneer road construction.	100%	1. Insure stable slopes during construction. 2. Seed and fertilize exposed soil. 3. Avoid construction during wet periods. 4. Use slash filter windrows.	ER/Contracting Officer will be responsible for enforcing contract specifications. The purchaser is responsible for submitting an operating plan that includes erosion control measures.	ER	B(T)6.6 B(T)5.23 B(T)6.31 B(T)6.312 B(T)6.311 SPS 204

SWCP	SWCP OBJECTIVE	PERCENT EFFECTIVE	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
15.09	TIMELY EROSION CONTROL MEASURES ON INCOMPLETE ROADS AND STREAM CROSSING PROJECTS - To minimize erosion of and sedimentation from disturbed ground on incomplete projects.	96%	1. Avoid construction during wet periods. 2. Use slash filter windrows or silt fence. 3. Seed and fertilize disturbed areas.	IDT has identified project location and mitigation measures in NEPA process. Protective measures will be kept current on all areas of disturbed, erosion-prone areas. TSA insures contract compliance.	IDT; TSA	B(T)6.31 B(T)6.6 B(T)5.23 B(T)6.66 C(T)6.6
15.10	CONTROL OF ROAD CONSTRUCTION, EXCAVATION, AND SIDE-CAST MATERIAL - To reduce sedimentation from unconsolidated excavated and side-cast material caused by road construction, reconstruction, or maintenance.	96%	1. Do not side-cast into waterways or sensitive areas. 2. Use slash filter windrows or silt fence.	IDT has identified project location and mitigation measures in NEPA process. Protective measures will be kept current on all areas of disturbed, erosion-prone areas. TSA insures contract compliance.	IDT; TSA	B(T)5.3 C(T)5.31# SPS 203 SPS 204
15.11	SERVICING AND REFUELING EQUIPMENT - To prevent contamination of waters from accidental spills of fuels, lubricants, bitumens, and other harmful materials.	99%	1. Insure proper fuel storage and transportation. 2. Keep fuel from streams, wetlands, ponds, and lakes.	ER/TSA/Contracting Officer will designate the location, size, and uses of service refueling areas. All projects will adhere to the KNF Hazardous Substance Spill Plan in case of accidents.	ER; TSA	B(T)6.222 B(T)6.34 B(T)6.341
15.12	CONTROL OF CONSTRUCTION IN RIPARIAN AREAS - To minimize the adverse effects on riparian areas from roads.	97%	1. Follow INFS Standards and Guidelines for construction within riparian areas. 2. Use slash filter windrows or silt fence. 3. Install ditch relief culverts and surface water deflectors before/after stream crossings.	Proposed new and temporary roads will adhere to guidelines in the Montana Streamside Management Zone Law (HB-731). All road activities will follow INFS Standards and Guidelines for road management.	ER; TSA	B(T)6.5 B(T)6.62 C(T)6.50# SPS 206 SPS 206A
15.13	CONTROLLING IN-CHANNEL EXCAVATION - To minimize stream channel disturbances and related sediment production.	94%	1. Use silt fence to minimize introduced sediment. 2. Use minimum amount of road. 3. Construct minimum number of crossings	BMP improvements at crossings would adhere to the guidelines in Montana Streamside Management Zone Law (HB-731) and the INFS Standards and Guidelines for road management.	ER; TSA	B(T)6.5 SPS 204 SPS 206 206A
15.14	DIVERSION OF FLOWS AROUND CONSTRUCTION SITES - To minimize downstream sedimentation by insuring all stream diversions are carefully planned.	93%	1. Divert streamflow around construction. 2. Use silt fence to minimize introduced sediment. 3. Construction during low-flow	The IDT has determined, where stream crossings meet multiple resource objectives, the crossings would require a State 124 permit. This would require the State Fish, Wildlife, and Parks to review the adequacy of the proposed mitigation. Compliance with contract provisions would be done by the ER.	IDT; ER	B(T)6.5 B(T)6.31 C(T)6.50# C(T)6.6
15.15	STREAM CROSSINGS ON TEMPORARY ROADS - To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.	96%	1. Consult Hydrologist on placement of crossing 2. Use minimum number of stream crossings. 3. Construction during low-flow. 4. Follow INFS Standards and Guidelines for construction within riparian areas.	The IDT identifies areas in need of a temporary road during the NEPA process. Proposed stream crossings would adhere to the guidelines in Montana Streamside Management Zone Law (HB-731).	PSF	N/A
15.16	BRIDGE AND CULVERT INSTALLATION - To minimize sedimentation and turbidity resulting from excavation for in-channel structures.	98%	1. Installation should be done during periods of low flow. 2. Instream sediment retention devices should be used throughout implementation.	IDT has identified project location and mitigation measures in NEPA process. Protective measures will be kept current on all areas of disturbed, erosion-prone areas. TSA insures contract compliance.	IDT; TSA	C(T)6.5#

SWCP	SWCP OBJECTIVE	PERCENT EFFECTIVE	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
15.17	REGULATION OF BORROW PITS, GRAVEL SOURCES, AND QUARRIES - To minimize sediment production from borrow pits, gravel sources, and quarries and limit channel disturbance in those gravel sources suitable for development in floodplains.	98%			ER	B(T)6.5 C(T)6.50#
15.18	DISPOSAL OF RIGHT-OF-WAY AND ROADSIDE DEBRIS - To insure that debris generated during road construction is kept out of streams and prevent slash and debris from subsequently obstructing channels.	97%	1. Debris and slash generated during road construction should not be side-cast into streams.	Proposed road construction will adhere to the guidelines in the Montana Streamside Management Zone Law (HB-731).	ER	Std Spec 201 SPS 201
15.19	STREAM BANK PROTECTION – To minimize sediment production from stream banks and structural abutments in natural waterways.	98%	1. Take precautions to minimize or eliminate disturbance to stream banks. 2. Maintain instream structures.	IDT has identified project location and mitigation measures during NEPA process. Protective measures will be kept current on all areas of disturbed soils. TSA and ER insures contract compliance.	IDT; ER; TSA	Std Spec 619
15.20	WATER SOURCE DEVELOPMENT CONSISTENT WITH WATER QUALITY PROTECTION - To supply water for road construction and maintenance and fire protection while maintaining water quality.	91%			ER; FMO	Std Spec 207
15.21	MAINTENANCE OF ROADS - To maintain all roads in a manner that provides for soil and water protection by minimizing rutting, failures, side-cast, and blockage of drainage facilities.	96%	1. Contract Clause CT 5.31#.	Road maintenance associated with a timber sale is the responsibility of purchaser. The ER/SA will insure that the purchaser maintains roads according to the appropriate maintenance level.	ER; SA	B(T)5.12 B(T)5.3 B(T)6.6 C(T)6.6 C(T)5.32# B(T)6.31
15.22	ROAD SURFACE TREATMENT TO PREVENT LOSS OF MATERIALS - To minimize the erosion of road surface materials and, consequently, reduce the likelihood of sediment production.	97%	1. Maintenance of road surface should include proper blading and/or dust abatement. 2. Use crush-gravel where necessary.	Protective measures will be kept current on all areas of disturbed, erosion-prone areas. ER insures contract compliance.	IDT; ER	B(T)5.3 C(T)5.31# C(T)5.314#
15.23	TRAFFIC CONTROL DURING WET PERIODS - To reduce the potential for road surface disturbance during wet weather and reduce sedimentation.	96%	1. Avoid hauling during wet periods.	Road restrictions and traffic control measures will be implemented on all haul roads when damage would occur during spring breakup. The decision to restrict a road is made by the ER. Hauling restrictions would be controlled by the TSA.	ER; TSA	B(T)6.6 C(T)6.6 C(T5).316# C(T)5.41#
15.24	SNOW REMOVAL CONTROLS - To minimize the impact of snow melt on road surfaces and embankments and reduce the probability of sediment production resulting from snow removal operations.	96%	1. Be careful not to leave snow berm at edge of road where possible. 2. Where a berm cannot be avoided, insure proper drainage by opening sections of berm to allow water to leave road surface.	Snow removal will be kept current on all roads associated with winter logging operations. The TSA insures compliance with contract provisions.	IDT; TSA	C(T)5.316# Std Spec 203.09

SWCP	SWCP OBJECTIVE	PERCENT EFFECTIVE	RECOMMENDED BEST MANAGEMENT PRACTICES BY IDT/TSA	CONSIDERATIONS FOR BEST MANAGEMENT PRACTICES	PERSON(S) RESPONSIBLE	CONTRACT PROVISIONS
15.25	OBLITERATION OF TEMPORARY ROADS - To reduce sediment generated from temporary roads by obliterating them at the completion of their intended use.	95%	1. Re-contour road fully where feasible. 2. Seed and fertilize exposed soil. 3. Pull slash and woody debris back onto rehabilitated road.	This work will be done on all new temporary roads in the decision area. The work will be done by the purchaser with compliance by the TSA.	TSA	B(T)6.63 C(T)6.6 C(T)6.632# C(T)6.633#
18.03	PROTECTION OF SOIL AND WATER FROM PRESCRIBED BURNING EFFECTS - To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris from entering surface water.	100%	1. Follow INFS Standards and Guidelines for burning in RHCAs. 2. Adhere to SMZ Law. 3. Where harvest within riparian areas is proposed, either the slash should be removed with the tree or scattered and not treated.	Broadcast burning adjacent to riparian areas will adhere to guidelines in the Montana Streamside Management Zone Law (HB-731). Prescribed burn plans identify the conditions necessary to prevent soil damage and meet site preparation objectives.	FMO	N/A

APPENDIX 3

MONITORING PLAN

Several sources of funding are available for resource monitoring. No assignment of funding source to the monitoring will be made at this time because future availability of funds is unknown. Completion of these monitoring items is dependent upon available funding.

I. SOILS

1. What: Monitor soil moisture conditions prior to allowing tractor skidding to assure compliance with soil moisture guidelines that limit tractor skidding when moisture is above 18%. Soils are more vulnerable to compaction when soil moisture exceeds 18%.

   Who: Timber Sale Administrator.

   How: Soil moisture sampling at representative sites within tractor units. This activity is part of normal contract administration, and therefore would be accomplished if a timber sale sells.

   When: Before allowing cutting of timber or skidding on tractor units, and following precipitation events that have the potential to raise soil moistures above 18%.

2. What: Soil disturbance resulting from logging and related operations may be monitored as part of the Forest Plan monitoring program.

   Who: Forest Soil Scientist, District Hydrologist.

   How: Transects in representative harvest units to determine percent soil disturbance. Monitoring will be conducted on a representative sample basis as part of Forest Plan monitoring. Units from this particular project may or may not be selected for monitoring.

   When: Following harvest and fuels treatment activities.

3. What: Monitor coarse woody debris (CWD) in harvest units as outlined in the Management Requirements and Design Criteria found in Chapter 2 of this document.

   Who: District Hydrologist

   How: Transects in representative harvest units to determine mean tons per acre of CWD. Monitoring will be conducted on a representative sample basis as part of larger data set. Units from this particular project may or may not be selected for monitoring.

4. When: Following harvest and fuels treatment activities.

II. FUELS REDUCTION

1. What: Fuel moisture conditions would be monitored prior to prescribed burning to ensure that objectives of fuels reduction prescriptions are met.

   Who: Fire Management Officer, Burn Boss

   How: Use standard fuel moisture monitoring techniques. Funding for this monitoring would come from brush disposal.

   When: Prior to planned ignition.

III. VEGETATION/TIMBER MANAGEMENT

1. What: Reforestation surveys in regeneration harvest units to ensure restocking standards are met.

   Who: Silviculturist

   How: Standard reforestation survey techniques would be used to determine reforestation status. Reforestation surveys would be funded with protected KV funds, which are guaranteed if timber is sold.

   When: At a minimum, surveys would generally occur during the first, third, and fifth years following initiation of natural or artificial regeneration.

2. What: Compliance with the timber sale contract.

   Who: Timber Sale Administrator

   How: This monitoring would occur as a fundamental component of timber sale administration. Funding would be guaranteed if a timber sale were sold. Minor contract changes or modifications would be enacted when necessary to meet objectives and standards on the ground, when agreed to by the Forest Service and timber sale purchaser.

   When: During life of the contract.

3. What: Post-harvest surveys to validate silvicultural prescriptions. The objective is to determine whether prescription revisions are needed before the next phases of the project (site preparation and reforestation) take place.

   Who: Silviculturist

   How: Walk through surveys and transects would be conducted with protected KV funds on regeneration harvested units. For intermediate harvest units, implementation is dependent on KV funding levels, and may not occur if adequate funds are not generated by the sale or if workloads or priorities supercede surveys.

   When: After harvest and prior to site preparation.

IV. ROADS

1. What: Monitor road maintenance for BMP implementation and effectiveness.

   Who: Engineering Representative/COR, Timber Sale Administrator, District Hydrologist, and/or IDT.

   How: On-site inspections conducted as part of contract inspection. Implementation would occur if sale is sold. Effectiveness monitoring would occur on a representative sample basis during Forest Plan BMP monitoring reviews of selected projects. Roads from this particular project may or may not be selected for monitoring.

   When: During and immediately following maintenance activities for implementation and post harvest activities.

2. What: Monitor effectiveness of access control of roads used for sale, but restricted for public motorized use. Monitor effectiveness of road closure devices installed as part of sale contract during life of sale.

   Who: Timber Sale Administrator

   How: As routine part of contract compliance inspections. Implementation would occur if sale is sold.

   When: Through life of sale contract.

V. WATER RESOURCES

1. What: Implementation and effectiveness of applicable BMPs. Detailed descriptions of BMPs applicable to specific activities and alternatives are located in the DEIS (Appendix 2) and the Aquatic Resources Section of the Project File.

   Who: Timber Sale Administrator, Engineering Representative/COR, District Hydrologist, IDT.

   How: Implementation would be documented with BMP inspection reports and/or Timber Sale Inspection Reports. This monitoring would occur as a fundamental component of timber sale and road contract administration. This may also be included in the Forest Plan BMP monitoring program. Inspection reports would be completed as part of the annual district BMP effectiveness monitoring program. Only a portion of this project may be selected for District-wide BMP effectiveness sampling.

   When: Implementation inspection reports would be completed as applicable during and immediately following project activities. If selected, effectiveness inspections could be conducted one to five years after implementation.

2. What: Monitor protection and management of stream channels, riparian areas, and riparian habitat conservation areas (RHCAs) during timber harvest and road reconstruction.

   Who: Timber Sale Administrator, Engineering Representative/COR, District Hydrologist.

   How: This monitoring would occur as a fundamental component of timber sale administration.

   When: During implementation of activities that occur in or near riparian areas or wetlands.

3. What: Monitor success of revegetation efforts on disturbed sites such as skid trails, landings, temporary roads, and road cuts/fills.

   Who: Timber Sale Administrator, District Hydrologist.

   How: Field inspection of seeded sites at the close of the sale and 2 to 3 years after the sale.

   When: Sites are inspected to ensure initial seeding and success in the years following the initial seeding. Additional seeding would then be done if the success rate is low.

4. What: Water quantity and quality monitoring.

   Who: District Hydrologist.

How: Field collection of stream flow, temperature, and suspended sediment samples, following USGS protocols.

When: Periodically throughout the year as part of a larger data set across the district.

5. What: Channel geometry monitoring to assess trends in channel condition.

   Who: District Hydrologist.

   How: Repeated cross-section and channel geometry surveying in designated, monumented reaches.

   When: Every three to five years for sites within the planning subunit.

6. What: Monitor fish population size and structure.

   Who: District Fish Biologist, District Hydrologist.

   How: Repeated electro-fishing in designated reaches to monitor changes in population size and structure.

   When: Every three to five years for sites within the planning subunit.

VI. NOXIOUS WEEDS

1. What: Monitor compliance with timber sale contract clause C(T)6.351# requiring washing of off-road logging equipment prior to entering sale area.

   Who: Timber Sale Administrator

   How: Visual inspection. Part of routine contract administration - implementation guaranteed.

   When: Prior to logging equipment being moved into the sale area.

2. What: Noxious weed monitoring along roads and disturbed sites (landings, skid trails, fire lines) within the Analysis Area. If detected, sites would be incorporated into District Noxious Weed Control Program.

   Who: Weed Management Coordinator

   How: On site inspections and gathering reports from other personnel. Dependent upon adequate KV and appropriated funding.

   When: Every other year for up to ten years after sale activities, during resource surveys.

VII. WILDLIFE

1. What: Collect reserve tree and snag numbers marked in regeneration harvest units. Conduct a representative sample of units within each VRU (2 units in each VRU represented in the Analysis Area). This item would provide baseline numbers for monitoring items 2 and 3 below.

   Who: Timber/Pre-Sale Marking Crew

How: The timber marking crew would tally snag and reserve tree numbers during marking, and only in those regeneration harvest units with leave tree marking (in the sampling numbers discussed above).

When: During the marking of the regeneration units that require leave tree marking.

2. What: Monitor snag retention within those regeneration harvest units surveyed in #1 (above) to determine if snag management strategies are meeting Forest Plan cavity habitat direction.

   Who: Silviculture crew

   How: Work would be completed concurrent with reforestation surveys.

   When: These surveys would take place after harvest and site-preparation has occurred on individual units, but generally within five years from end of harvest.

3. What: Monitor reserve tree retention within those regeneration harvest units surveyed in #1 (above). Maintenance of reserve trees insures that future cavity-nesting habitat and down woody recruitment are available to help provide future denning, feeding, and nesting habitat.

   Who: Silviculture crew

   How: Work would be completed concurrent with reforestation surveys.

   When: These surveys would take place after harvest and site-preparation have occurred on individual units, but generally within five years from the harvest.

4. What: Monitor the changes created by vegetative treatments (prescribed fire, timber harvest, including post harvest treatments e.g. underburn) on the attributes of old growth in treatment units. Conduct pre- and post-treatment surveys to collect vegetation data on a representative sample of units. Data must, at a minimum include snags, coarse woody debris, large trees, basal area, canopy closure, and structural layers (Green et al 1992).

   Who: Responsible position(s) – District Silviculturist and Fire Management Officer.

   How: Conduct pre- and post-treatment surveys to collect vegetation data using the common stand exam process. Data collected by the Common Stand Exam has broader application both forest and region wide.

   When: Conduct pre-treatment surveys as part of the development of the silvicultural prescription. Conduct two post-treatment surveys, at one and five years.

APPENDIX 4

Fuel Treatment and the Camp 32 Fire:

A Success Story

The Camp 32 wildfire that occurred on August 7, 2005 burned approximately 802 acres and is indicative of the fuel problem that exists within lower elevation stands in north-west Montana. The fire start was in the lower elevations of the Pinkham Creek drainage and the proximity to residences and private land highlights the concerns with unplanned wildfire. Suppression efforts were costly and far more impactive in a short time frame than planned fuels treatments. Residences in the immediate vicinity were evacuated for several days and many others north of the fire were put on evacuation notice. Smoke impacts to the local area were high during the early stages of the fire.

On June 16, 1999 the Record of Decision (ROD) for the Pinkham Timber Sales and Associated Activities EIS was signed. The selected action planned to treat nearly 8,000 acres of fuels using a combination of timber harvest and prescribed burning to reduce the fuel loadings in key areas. The Selected Action would help reduce the chances of a wildfire burning toward residences in the Pinkham Creek area as well as the communities of Eureka and Rexford. The treatments would greatly reduce the risk of a stand-replacing fire and smoke impacts to local residents.

Figure 1. Camp 32 fire burned both sides of Pinkham Road (middle). Left side of the road was untreated. The right side had previous treatments. Wind pushed the fire from left to right.

At the time of the fire approximately half of the planned treatments within the decision area were completed. The fire burned into one of the completed treatment areas. Treatments occurred in the Black Butte Rehabilitation sale area. The units were commercially thinned from below in 2001. The silvicultural prescription called for leaving all ponderosa pine and leaving western larch over twelve inches diameter at breast height (DBH). Treatments left the largest, most vigorous trees on site. Following the commercial thin, Forest Service personnel slashed the damaged residual understory. Fuels accumulations were such on 39 acres of the unit that excavator piles were created to reduce the fuels along the Pinkham Creek Road prior to prescribed burning. The excavator piles were created in the summer of 2002 and burned later in the fall. A 437 acre understory burn was completed in the spring of 2003. Objectives of this burn were to decrease the ground fuels by burning 70-90% of the fuels less than three inches in diameter, kill 50-70% of the stems less than five inches DBH, maintain or improve forage quantity and quality, and to keep the overstory mortality to less than ten percent.

Figure 2. Treated stand, north of Pinkham Road

The Camp 32 fire started southwest of the Pinkham Creek Road and burned to the north east. Extreme fire behavior was exhibited during the afternoon of August 7th, including crown fire, torching, and spotting up to a half mile, in stands that had received no fuels treatment. As the fire reached and crossed the Pinkham Creek Road the resulting fire behavior on treated sites was a surface fire. The overstory mortality on treated sites was less than 1% versus 50-100% on untreated areas.

Suppression efforts at the head of the fire in the untreated stands were futile. A flanking action was all that could be done, and even that was difficult. However, once the fire reached the treated area, suppression crews were able to safely attack the head of the fire. The Eureka Volunteer Fire Department (EVFD) played a large role in the initial suppression of the fire as well as the structure protection. John Livingston, president of EVFD, commented, "It was very evident that the treated area was crucial to the successful outcome of this incident."

Figure 3. Untreated stand, south of Pinkham Road

Community and agency support has been instrumental in the success of the fuels program on the Rexford Ranger District. North Lincoln County Community Forester, Bob Seidel said, "It was obvious that the fuel treatment that was done in the Camp 32 fire area had an effect on the fire behavior of the fire. There is no doubt that the fire transformed from a crown fire to a ground fire. If the treatment hadn't been done, the fire would have ended up burning over Black Butte and into the Black Lake Road area, affecting many more homes. If more of this type of treatment had been done the fire would never have gotten as big as it did."

The effect of the fuels treatment that was done in the vicinity of the Camp 32 Fire was a real eye opener for much of the public. The Rexford District has been working on fuel treatment projects in the urban interface for 20 years, and this is the second example of the benefits of fuel treatments on wildfires in the past 11 years (the Douglas Hill Fire, 1994). Telling the public that fuels treatment is important is one thing, but when they see that it actually works they become more accepting of projects when they are proposed.

While the treated area played a large role in slowing down the Camp 32 Fire and saving many homes in its path, the other important aspect of fuel treatment is that the treated area served as a safe place for firefighters to work. According to Ron Hvizdak, District Fire Management Officer, "Firefighter safety is a big issue these days, and providing a safe place for firefighters to work before the fire even starts is just as important, if not more so, than safety related training itself. Even under the hot, dry windy conditions that existed on August 7th, fire behavior in the treated stand was such that initial attack crews could get up close to the fire's edge and work safely, even at the head of the fire. Suppression efforts on the untreated area were much more difficult on the flanks and impossible at the head."

APPENDIX 5

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
			Wildfires		
			Wildfire pre-1975		
10302077	6.0	1948	FS		
10204010	189.0	1974	FS		
10204076	8.0	1974	FS		
			Wildfire 1985 - 1994		
10303062	12.0	1987	FS		
10303030	12.0	1987	FS		
10303033	14.0	1987	FS		
10303012	39.0	1987	FS		
10303031	14.0	1987	FS		
10303014	14.0	1987	FS		
10303043	27.0	1987	FS		
			Wildfire 1995 - 2004		
10303055	7.0	1987	FS		
10201206	16.0	2000	FS		
10201205	4.0	2000	FS		
			Regeneration Harvest		
			Regeneration Harvest pre-1975		
10503009	19.0	1943	FS		
10101003	8.0	1945	FS		
10502018	37.0	1945	FS		
10101032	15.0	1946	FS		
10105006	30.0	1949	FS		
10101016	18.0	1950	FS		
10102003	72.0	1950	FS		
10503008	122.0	1950	FS		
10102002	15.0	1954	FS		
10103006	19.0	1955	FS		
10503004	127.0	1955	FS		
10101019	27.0	1955	FS		
10501006	76.0	1955	FS		
10103029	27.0	1955	FS		
10502004	32.0	1955	FS		
10401006	83.0	1955	FS		
10101010	18.0	1956	FS		
10401008	38.0	1956	FS		
10301002	63.0	1956	FS		
10502010	13.0	1958	FS		
10503006	102.0	1958	FS		
10105002	35.0	1958	FS		
10105003	26.0	1958	FS		
10103001	163.0	1958	FS		
10502001	95.0	1958	FS		
10303010	34.0	1958	FS		
10303001	149.0	1958	FS		
10304001	46.0	1959	FS		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10103008	52.0	1959	FS		
10502009	27.0	1959	FS		
10104014	9.0	1960	FS		
10301020	55.0	1960	FS		
10104017	2.0	1960	FS		
10503002	71.0	1960	FS		
10206008	11.0	1960	FS		
10301144	25.0	1960	FS		
10104011	18.0	1960	FS		
10104026	6.0	1960	FS		
10301007	39.0	1960	FS		
10103012	47.0	1960	FS		
10301001	38.0	1960	FS		
10104018	3.0	1960	FS		
10104015	3.0	1960	FS		
10104013	13.0	1960	FS		
10104016	3.0	1960	FS		
10301008	6.0	1960	FS		
10301145	3.0	1960	FS		
10501025	13.0	1960	FS		
10502023	140.0	1960	FS		
10302005	53.0	1960	FS		
10502022	10.0	1960	FS		
10503020	57.0	1960	FS		
10503010	26.0	1960	FS		
10104004	20.0	1961	FS		
10104001	72.0	1962	FS		
10104057	26.0	1962	FS		
10104009	21.0	1962	FS		
10201012	17.0	1963	FS		
10204001	201.0	1963	FS		
10204042	49.0	1963	FS		
10501008	19.0	1963	FS		
10206002	16.0	1963	FS		
10501002	44.0	1963	FS		
10401004	30.0	1963	FS		
10401005	36.0	1963	FS		
10401003	32.0	1963	FS		
10201007	29.0	1964	FS		
10201008	41.0	1964	FS		
10201006	39.0	1964	FS		
10201003	21.0	1964	FS		
10201009	24.0	1964	FS		
10201005	20.0	1964	FS		
10201004	24.0	1964	FS		
10201002	60.0	1964	FS		
10302004	21.0	1964	FS		
10201001	37.0	1964	FS		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10201013	39.0	1964	FS		
10201014	40.0	1964	FS		
10201015	28.0	1964	FS		
10302003	46.0	1964	FS		
10302002	37.0	1964	FS		
10403005	45.0	1964	FS		
10402001	44.0	1964	FS		
10403003	36.0	1964	FS		
10403002	33.0	1964	FS		
10403001	41.0	1964	FS		
10205001	35.0	1965	FS		
10301034	9.0	1965	FS		
10301003	21.0	1965	FS		
10206003	35.0	1965	FS		
10302001	43.0	1965	FS		
10503011	60.0	1965	FS		
10401002	41.0	1965	FS		
10103003	67.0	1966	FS		
10103005	151.0	1966	FS		
10206001	49.0	1966	FS		
10206004	25.0	1966	FS		
10302006	65.0	1966	FS		
10503001	85.0	1966	FS		
10103009	38.0	1967	FS		
10501004	28.0	1968	FS		
10104010	54.0	1968	FS		
10502006	26.0	1968	FS		
10201010	30.0	1969	FS		
10502007	12.0	1969	FS		
10502003	65.0	1969	FS		
10502005	47.0	1969	FS		
10302007	21.0	1969	FS		
10303003	9.0	1969	FS		
10103701	259.0	1970	PVT		
10101006	21.0	1971	FS		
10101030	14.0	1971	FS		
10101005	16.0	1971	FS		
10303026	13.0	1972	FS		
10303002	19.0	1972	FS		
10303027	16.0	1972	FS		
10303029	10.0	1972	FS		
10303062	12.0	1972	FS		
10303030	12.0	1972	FS		
10303033	14.0	1972	FS		
10303042	31.0	1972	FS		
10303031	14.0	1972	FS		
10205006	192.0	1973	FS		
10206006	111.0	1973	FS		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10206062	32.0	1973	FS		
10302034	26.0	1973	FS		
10302025	29.0	1973	FS		
10201054	30.0	1974	FS		
10201055	21.0	1974	FS		
10201056	36.0	1974	FS		
10201067	9.0	1974	FS		
10201039	19.0	1974	FS		
10201053	19.0	1974	FS		
10201042	18.0	1974	FS		
10201052	23.0	1974	FS		
10201065	26.0	1974	FS		
10201066	6.0	1974	FS		
10201063	9.0	1974	FS		
10201047	4.0	1974	FS		
10201062	22.0	1974	FS		
10201048	24.0	1974	FS		
10201057	9.0	1974	FS		
Regeneration Harvest 1975 - 1984					
10201064	22.0	1975	FS		
10201040	9.0	1976	FS		
10201041	28.0	1976	FS		
10201043	21.0	1976	FS		
10201045	30.0	1976	FS		
10201044	14.0	1976	FS		
10201051	3.0	1976	FS		
10201050	8.0	1976	FS		
10201046	27.0	1976	FS		
10302022	19.0	1976	FS	66675	NO SALE NAME
10201049	12.0	1976	FS		
10206022	14.0	1976	FS		
10301146	6.0	1976	FS		
10301012	35.0	1977	FS		
10302026	15.0	1977	FS		
10302023	40.0	1977	FS	66675	NO SALE NAME
10206020	42.0	1977	FS		
10206018	40.0	1977	FS		
10301013	20.0	1977	FS		
10301014	46.0	1977	FS		
10301016	15.0	1977	FS		
10301068	1.0	1977	FS		
10302056	12.0	1978	FS		
10206130	7.0	1978	FS		
10301015	19.0	1978	FS		
10301069	6.0	1978	FS		
10201245	5.0	1978	FS		
10201245	5.0	1978	FS		
10201058	15.0	1978	FS		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10201245	5.0	1978	FS		
10201245	5.0	1978	FS		
10201058	15.0	1978	FS		
10201058	15.0	1978	FS		
10201058	15.0	1978	FS		
10201058	15.0	1978	FS		
10201245	5.0	1978	FS		
10201058	15.0	1978	FS		
10201058	15.0	1978	FS		
10206019	16.0	1978	FS		
10301080	6.0	1978	FS		
10301079	3.0	1978	FS		
10301081	4.0	1978	FS		
10301078	5.0	1978	FS		
10301083	5.0	1978	FS		
10301084	2.0	1978	FS		
10206021	43.0	1978	FS		
10301087	2.0	1978	FS		
10206025	33.0	1978	FS		
10301076	8.0	1978	FS		
10301082	1.0	1978	FS		
10301085	4.0	1978	FS		
10206026	10.0	1978	FS		
10301072	4.0	1978	FS		
10301088	3.0	1978	FS		
10301141	2.0	1978	FS		
10301029	11.0	1978	FS		
10302021	31.0	1978	FS	66675	NO SALE NAME
10403031	2.0	1978	FS		
10204012	2.0	1979	FS		
10204013	3.0	1979	FS		
10205015	10.0	1979	FS		
10204014	2.0	1979	FS		
10204007	8.0	1979	FS		
10205014	10.0	1979	FS		
10206016	20.0	1979	FS		
10206017	41.0	1979	FS		
10206014	34.0	1979	FS		
10206015	15.0	1979	FS		
10302020	16.0	1979	FS	66675	NO SALE NAME
10302019	39.0	1979	FS	66675	NO SALE NAME
10302024	72.0	1979	FS	66675	NO SALE NAME
10402039	13.0	1979	FS		
10302018	40.0	1979	FS	66675	NO SALE NAME
10403027	4.0	1979	FS		
10403028	24.0	1979	FS		
10403029	28.0	1979	FS		
10403032	14.0	1979	FS		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10304075	63.0	1979	FS		
10101733	186.0	1980	PVT		
10201094	5.0	1980	FS	66549	LEGACY SALE W/O NAME
10201093	28.0	1980	FS	66549	LEGACY SALE W/O NAME
10205005	148.0	1980	FS		
10301142	6.0	1980	FS		
10302028	7.0	1980	FS		
10302017	24.0	1980	FS	66675	NO SALE NAME
10201082	19.0	1981	FS	66549	LEGACY SALE W/O NAME
10201076	19.0	1981	FS	66549	LEGACY SALE W/O NAME
10201092	7.0	1981	FS	66549	LEGACY SALE W/O NAME
10301010	15.0	1981	FS		
10301131	24.0	1981	FS		
10201103	21.0	1982	FS		
10201095	6.0	1982	FS	66549	LEGACY SALE W/O NAME
10206072	50.0	1982	FS	66554	SOUTH_YOUNG_BUGS
10301110	11.0	1982	FS		
10301126	21.0	1982	FS		
10301116	8.0	1982	FS		
10301114	39.0	1982	FS		
10301115	17.0	1982	FS		
10301111	57.0	1982	FS		
10301118	43.0	1982	FS		
10301011	88.0	1982	FS		
10302016	29.0	1982	FS	66555	LEGACY SALE W/O NAME
10201135	25.0	1983	FS		
10201136	19.0	1983	FS		
10206005	113.0	1983	FS	66566	LEGACY SALE W/O NAME
10206074	16.0	1983	FS	66589	LEGACY SALE W/O NAME
10206117	3.0	1983	FS	66577	LEGACY SALE W/O NAME
10201075	13.0	1984	FS	66549	LEGACY SALE W/O NAME
10201077	19.0	1984	FS	66549	LEGACY SALE W/O NAME
10201097	17.0	1984	FS	66549	LEGACY SALE W/O NAME
10201079	37.0	1984	FS	66549	LEGACY SALE W/O NAME
10201081	7.0	1984	FS	66549	LEGACY SALE W/O NAME
10201080	26.0	1984	FS	66549	LEGACY SALE W/O NAME
10201098	16.0	1984	FS	66549	LEGACY SALE W/O NAME
10201096	11.0	1984	FS	66549	LEGACY SALE W/O NAME
10201091	20.0	1984	FS	66549	LEGACY SALE W/O NAME
10201137	21.0	1984	FS	00125	YOUNG_STATELINE
10201138	7.0	1984	FS	00125	YOUNG_STATELINE
10201140	7.0	1984	FS	00125	YOUNG_STATELINE
10201139	8.0	1984	FS	00125	YOUNG_STATELINE
Regeneration Harvest 1985 - 1994					
10201024	18.0	1985	FS	66541	STATELINE RE-AD
10201150	20.0	1985	FS	66617	DOUGLAS YOUNG
10302032	29.0	1985	FS	66551	THREE FORKS
10205035	31.0	1985	FS	84005	GENEVA_PLUM PC

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10205045	20.0	1985	FS	84005	GENEVA_PLUM PC
10205034	14.0	1985	FS	84005	GENEVA_PLUM PC
10205033	11.0	1985	FS	84005	GENEVA_PLUM PC
10206107	11.0	1985	FS	66600	YOUNG_GENEVA_LP
10206081	17.0	1985	FS	84005	GENEVA_PLUM PC
10206084	14.0	1985	FS	84005	GENEVA_PLUM PC
10206082	10.0	1985	FS	84005	GENEVA_PLUM PC
10206086	21.0	1985	FS	84005	GENEVA_PLUM PC
10301120	15.0	1985	FS		
10206111	26.0	1985	FS		
10206116	7.0	1985	FS	66609	MARIAH_SIDEHILL
10403150	22.0	1985	FS	66607	CLINGFRONT
10303017	16.0	1985	FS	66551	THREE FORKS
10303018	11.0	1985	FS	66551	THREE FORKS
10302031	25.0	1985	FS	66551	THREE FORKS
10302100	2.0	1985	FS	66551	THREE FORKS
10303019	15.0	1985	FS	66551	THREE FORKS
10302029	5.0	1985	FS	66598	DODGE 99
10403151	35.0	1985	FS	66607	CLINGFRONT
10303032	44.0	1985	FS		
10204051	29.0	1986	FS	86005	YOUNG_CANADIAN_P.C.
10502028	17.0	1986	FS	66629	D-B SPUR
10205036	30.0	1986	FS	84005	GENEVA_PLUM PC
10205037	16.0	1986	FS	84005	GENEVA_PLUM PC
10205041	21.0	1986	FS	84005	GENEVA_PLUM PC
10205040	20.0	1986	FS	84005	GENEVA_PLUM PC
10206094	14.0	1986	FS	84005	GENEVA_PLUM PC
10206099	25.0	1986	FS	84005	GENEVA_PLUM PC
10206115	9.0	1986	FS	66609	MARIAH_SIDEHILL
10206024	14.0	1986	FS	66627	MARIAH'S_TOP
10302058	13.0	1986	FS	66608	DODGE SUMMIT
10304032	5.0	1986	FS	66551	THREE FORKS
10304035	8.0	1986	FS	66551	THREE FORKS
10204053	25.0	1987	FS	86005	YOUNG_CANADIAN_P.C.
10204052	20.0	1987	FS	86005	YOUNG_CANADIAN_P.C.
10301113	5.0	1987	FS	84005	GENEVA_PLUM PC
10301112	2.0	1987	FS	84005	GENEVA_PLUM PC
10206106	9.0	1987	FS	84005	GENEVA_PLUM PC
10206097	11.0	1987	FS	84005	GENEVA_PLUM PC
10206113	12.0	1987	FS	84005	GENEVA_PLUM PC
10301147	8.0	1987	FS	84005	GENEVA_PLUM PC
10206104	14.0	1987	FS	84005	GENEVA_PLUM PC
10206095	16.0	1987	FS	84005	GENEVA_PLUM PC
10302008	36.0	1987	FS	66641	DODGE LOADING CHUTE
10206102	13.0	1988	FS	84005	GENEVA_PLUM PC
10302011	8.0	1988	FS		
10205044	7.0	1988	FS	84005	GENEVA_PLUM PC
10205043	19.0	1988	FS	84005	GENEVA_PLUM PC

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10205042	20.0	1988	FS	84005	GENEVA_PLUM PC
10206096	18.0	1988	FS	84005	GENEVA_PLUM PC
10206090	9.0	1988	FS	84005	GENEVA_PLUM PC
10206061	24.0	1988	FS	66646	SUTTON_STK_&SAW_LOG
10206103	24.0	1988	FS	84005	GENEVA_PLUM PC
10206108	10.0	1988	FS	84005	GENEVA_PLUM PC
10206114	6.0	1988	FS	84005	GENEVA_PLUM PC
10206093	20.0	1988	FS	84005	GENEVA_PLUM PC
10206196	11.0	1988	FS		
10303025	23.0	1988	FS		
10304018	15.0	1988	FS		
10304017	33.0	1988	FS		
10304014	23.0	1988	FS		
10201145	25.0	1989	FS	86005	YOUNG_CANADIAN_P.C.
10201016	13.0	1989	FS	86005	YOUNG_CANADIAN_P.C.
10204054	12.0	1989	FS	86005	YOUNG_CANADIAN_P.C.
10201147	19.0	1989	FS	86005	YOUNG_CANADIAN_P.C.
10204056	27.0	1989	FS	86005	YOUNG_CANADIAN_P.C.
10201078	21.0	1989	FS	88162	LOST_HUNTER_OSR
10302009	12.0	1989	FS	87122	87 DODGE
10303021	19.0	1989	FS	88116	THREE FK RE-AD AREA
10304039	30.0	1989	FS	85002	CLINGBACK_PC
10304037	13.0	1989	FS	85002	CLINGBACK_PC
10403146	29.0	1989	FS	85002	CLINGBACK_PC
10304036	28.0	1989	FS	85002	CLINGBACK_PC
10403144	14.0	1989	FS	85002	CLINGBACK_PC
10403143	28.0	1989	FS	85002	CLINGBACK_PC
10304060	34.0	1989	FS	87113	LOWER RED
10403145	27.0	1989	FS	85002	CLINGBACK_PC
10304031	15.0	1989	FS	87113	LOWER RED
10204057	19.0	1990	FS	86005	YOUNG_CANADIAN_P.C.
10101721	197.0	1990	PVT		
10201146	34.0	1990	FS	86005	YOUNG_CANADIAN_P.C.
10201148	25.0	1990	FS	86005	YOUNG_CANADIAN_P.C.
10204055	7.0	1990	FS	86005	YOUNG_CANADIAN_P.C.
10201149	19.0	1990	FS	86005	YOUNG_CANADIAN_P.C.
10201155	41.0	1990	FS	86005	YOUNG_CANADIAN_P.C.
10205010	17.0	1990	FS	88160	PLUMB_WINDY_BLOWDOWN
10206035	54.0	1990	FS	89112	DIVIDE_SALVAGE_PC
10302015	36.0	1990	FS	88116	THREE FK RE-AD AREA
10303020	22.0	1990	FS	88116	THREE FK RE-AD AREA
10403111	3.0	1990	FS	85002	CLINGBACK_PC
10206208	4.0	1991	FS	92111	MARIAS_WEST_P_C
10301092	9.0	1991	FS	92111	MARIAS_WEST_P_C
10206180	27.0	1991	FS	93103	NORTH_MARIAS_P_C
10301135	8.0	1991	FS	93103	NORTH_MARIAS_P_C
10206177	29.0	1991	FS	93103	NORTH_MARIAS_P_C
10206118	16.0	1991	FS	91112	SOUTH_YOUNG

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10206179	29.0	1991	FS	93103	NORTH_MARIAS_P_C
10301137	3.0	1991	FS	93103	NORTH_MARIAS_P_C
10206178	9.0	1991	FS	93103	NORTH_MARIAS_P_C
10206184	8.0	1991	FS	93103	NORTH_MARIAS_P_C
10206183	24.0	1991	FS	91112	SOUTH_YOUNG
10301134	3.0	1991	FS	66509	POST & POLE SALE
10206174	76.0	1991	FS	89112	DIVIDE_SALVAGE_PC
10301124	43.0	1991	FS	92111	MARIAS_WEST_P_C
10302073	21.0	1991	FS	92111	MARIAS_WEST_P_C
10201195	28.0	1992	FS	92108	YOUNG_AT_49_PC
10201196	24.0	1992	FS	92108	YOUNG_AT_49_PC
10201190	45.0	1992	FS	91111	YOUNG_BOUNDARY_PC
10201191	11.0	1992	FS	91111	YOUNG_BOUNDARY_PC
10201192	36.0	1992	FS	91111	YOUNG_BOUNDARY_PC
10206185	9.0	1992	FS	92107	LOWER_GENEVA_P_C
10205080	34.0	1992	FS	92107	LOWER_GENEVA_P_C
10206181	10.0	1992	FS	93103	NORTH_MARIAS_P_C
10304016	38.0	1992	FS	93115	CLINGBACK_MTN_PC
10403007	6.0	1992	FS	93115	CLINGBACK_MTN_PC
10204096	28.0	1993	FS	91111	YOUNG_BOUNDARY_PC
10201198	72.0	1993	FS	92108	YOUNG_AT_49_PC
10204095	28.0	1993	FS	91111	YOUNG_BOUNDARY_PC
10204097	60.0	1993	FS	92107	LOWER_GENEVA_P_C
10302044	21.0	1993	FS	92110	DODGE_PC
10302079	24.0	1993	FS	92110	DODGE_PC
10302062	41.0	1993	FS	92110	DODGE_PC
10304071	40.0	1993	FS	92110	DODGE_PC
10302042	43.0	1993	FS	92110	DODGE_PC
10303045	25.0	1993	FS	92110	DODGE_PC
10201197	19.0	1994	FS	92108	YOUNG_AT_49_PC
10304072	34.0	1994	FS	92110	DODGE_PC
		Regeneration Harvest 1995 - 2004			
10205020	39.0	1995	FS	95103	ROBIN_BOUNDARY_PC
10201166	24.0	1996	FS	94101	YOUNG_CREEK
10201115	27.0	1996	FS	94101	YOUNG_CREEK
10201222	36.0	1996	FS	94101	YOUNG_CREEK
10205011	11.0	1996	FS	95103	ROBIN_BOUNDARY_PC
10206206	21.0	1996	FS	95103	ROBIN_BOUNDARY_PC
10402040	12.0	1996	FS	95115	POVERTY_SLOPE
10403109	39.0	1996	FS	94116	UPPER_FACE_PC
10201227	24.0	1997	FS	94101	YOUNG_CREEK
10201228	16.0	1997	FS	94101	YOUNG_CREEK
10201230	20.0	1997	FS	94101	YOUNG_CREEK
10201225	21.0	1997	FS	94101	YOUNG_CREEK
10201223	22.0	1997	FS	94101	YOUNG_CREEK
10301053	31.0	1997	FS	90112	MARIAS_EAST
10301046	10.0	1997	FS	90112	MARIAS_EAST
10301057	28.0	1997	FS	90112	MARIAS_EAST

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10301136	13.0	1997	FS	90112	MARIAS_EAST
10206207	5.0	1997	FS	90112	MARIAS_EAST
10301138	14.0	1997	FS	90112	MARIAS_EAST
10301102	22.0	1997	FS	90112	MARIAS_EAST
10403161	24.0	1998	FS	94116	UPPER_FACE_PC
10403198	43.0	1998	FS	97121	RANGER_HUNT_SALVAGE
10302099	14.0	1998	FS	97119	SUMMIT_SALVAGE
10302098	10.0	1998	FS	97119	SUMMIT_SALVAGE
10301149	14.0	1999	FS	97121	RANGER_HUNT_SALVAGE
10501033	5.0	2001	FS	01104	POVERTY REHAB
10501032	26.0	2002	FS	01104	POVERTY REHAB
10501034	28.0	2002	FS	01104	POVERTY REHAB
10201251	1.0	2003	FS	02105	YOUNG J FIRE SALVAGE
10201253	17.0	2003	FS	02105	YOUNG J FIRE SALVAGE
10201261	5.0	2003	FS	02105	YOUNG J FIRE SALVAGE
10201246	12.0	2004	FS	02105	YOUNG J FIRE SALVAGE
10201249	10.0	2004	FS	02105	YOUNG J FIRE SALVAGE
10201250	8.0	2004	FS	02105	YOUNG J FIRE SALVAGE
10201255	14.0	2004	FS	02105	YOUNG J FIRE SALVAGE
Regeneration Harvest 2005 - present					
10201248	16.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10201256	83.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10201254	19.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10204104	4.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10201257	32.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10204106	43.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10201258	15.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10204105	11.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10201259	57.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10204107	6.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10204108	20.0	2005	FS	02105	YOUNG J FIRE SALVAGE
10201260	10.0	2005	FS	02105	YOUNG J FIRE SALVAGE
Intermediate Harvest					
Intermediate Harvest pre-1975					
10101013	23.0	1950	FS		
10101014	21.0	1950	FS		
10101027	14.0	1950	FS		
10101028	20.0	1950	FS		
10101029	19.0	1950	FS		
10101038	18.0	1950	FS		
10101039	14.0	1950	FS		
10101040	18.0	1950	FS		
10101042	9.0	1950	FS		
10101043	20.0	1950	FS		
10101045	28.0	1950	FS		
10101046	11.0	1950	FS		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10101048	15.0	1950	FS		
10101049	10.0	1950	FS		
10101050	17.0	1950	FS		
10101051	8.0	1950	FS		
10101052	9.0	1950	FS		
10101053	5.0	1950	FS		
10101059	28.0	1950	FS		
10102009	7.0	1950	FS		
10102010	29.0	1950	FS		
10102017	22.0	1950	FS		
10102020	17.0	1950	FS		
10102025	24.0	1950	FS		
10103002	31.0	1950	FS		
10103011	55.0	1950	FS		
10103013	67.0	1950	FS		
10103015	6.0	1950	FS		
10103016	4.0	1950	FS		
10103017	14.0	1950	FS		
10103019	19.0	1950	FS		
10103020	21.0	1950	FS		
10103021	23.0	1950	FS		
10103022	16.0	1950	FS		
10103023	14.0	1950	FS		
10103025	6.0	1950	FS		
10103026	22.0	1950	FS		
10103027	14.0	1950	FS		
10104002	11.0	1950	FS		
10104005	14.0	1950	FS		
10104019	31.0	1950	FS		
10104020	17.0	1950	FS		
10104022	41.0	1950	FS		
10104023	12.0	1950	FS		
10104029	12.0	1950	FS		
10104034	18.0	1950	FS		
10104035	18.0	1950	FS		
10104036	17.0	1950	FS		
10104049	30.0	1950	FS		
10104050	12.0	1950	FS		
10105009	39.0	1950	FS		
10105023	4.0	1950	FS		
10302013	39.0	1950	FS		
10501011	37.0	1950	FS		
10501016	28.0	1950	FS		
10501019	9.0	1950	FS		
10501020	41.0	1950	FS		
10501024	7.0	1950	FS		
10501031	15.0	1950	FS		
10501037	3.0	1950	FS		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10502008	43.0	1950	FS		
10502017	32.0	1950	FS		
10502025	25.0	1950	FS		
10502026	13.0	1950	FS		
10502029	14.0	1950	FS		
10502030	21.0	1950	FS		
10502032	12.0	1950	FS		
10502033	52.0	1950	FS		
10502034	16.0	1950	FS		
10502035	10.0	1950	FS		
10502041	9.0	1950	FS		
10502045	21.0	1950	FS		
10502047	27.0	1950	FS		
10502050	29.0	1950	FS		
10503005	96.0	1950	FS		
10503007	23.0	1950	FS		
10503014	12.0	1950	FS		
10503015	22.0	1950	FS		
10503016	53.0	1950	FS		
10503017	44.0	1950	FS		
10503018	17.0	1950	FS		
10503021	24.0	1950	FS		
10503022	4.0	1950	FS		
10503023	11.0	1950	FS		
10503028	7.0	1950	FS		
10503031	22.0	1950	FS		
10503032	51.0	1950	FS		
10206011	49.0	1952	FS		
10204040	23.0	1954	FS		
10204041	30.0	1954	FS		
10502011	24.0	1957	FS		
10502012	6.0	1957	FS		
10502013	25.0	1957	FS		
10502015	16.0	1957	FS		
10502016	32.0	1957	FS		
10301006	140.0	1960	FS		
10402003	80.0	1964	FS		
10103001	163.0	1966	FS		
10301110	11.0	1966	FS		
10103008	52.0	1967	FS		
10304002	216.0	1967	FS		
10104004	20.0	1968	FS		
10104006	17.0	1968	FS		
10401010	23.0	1968	FS		
10402008	36.0	1968	FS		
10104007	39.0	1969	FS		
10104008	31.0	1969	FS		
10301004	69.0	1970	FS		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10401007	57.0	1970	FS		
10402004	13.0	1970	FS		
10101708	39.0	1971	PVT		
10101710	117.0	1971	PVT		
10101711	64.0	1971	PVT		
10101712	35.0	1971	PVT		
10101713	20.0	1971	PVT		
10101714	40.0	1971	PVT		
10301009	84.0	1971	FS		
10303004	55.0	1971	FS		
10303005	5.0	1971	FS		
10204004	18.0	1972	FS		
10204005	15.0	1972	FS		
10204006	21.0	1972	FS		
10104010	54.0	1973	FS		
10205011	11.0	1973	FS		
10201069	24.0	1974	FS		
10201070	14.0	1974	FS		
10201071	10.0	1974	FS		
10201072	9.0	1974	FS		
		Intermediate Harvest 1975-1984			
10402002	14.0	1975	FS		
10503701	34.0	1975	PVT		
10301005	10.0	1976	FS		
10403030	11.0	1978	FS		
10201099	9.0	1979	FS	66549	LEGACY SALE W/O NAME
10101001	28.0	1980	FS	66532	LEGACY SALE W/O NAME
10101002	28.0	1980	FS	66533	LEGACY SALE W/O NAME
10101004	31.0	1980	FS	66533	LEGACY SALE W/O NAME
10101005	16.0	1980	FS		
10101007	77.0	1980	FS	66533	LEGACY SALE W/O NAME
10101008	76.0	1980	FS	66533	LEGACY SALE W/O NAME
10101009	37.0	1980	FS	66533	LEGACY SALE W/O NAME
10101010	18.0	1980	FS	66533	LEGACY SALE W/O NAME
10101011	10.0	1980	FS	66533	LEGACY SALE W/O NAME
10101012	13.0	1980	FS	66533	LEGACY SALE W/O NAME
10101015	32.0	1980	FS	66533	LEGACY SALE W/O NAME
10101016	18.0	1980	FS		
10101018	81.0	1980	FS	66533	LEGACY SALE W/O NAME
10101019	27.0	1980	FS	66533	LEGACY SALE W/O NAME
10101020	12.0	1980	FS	66533	LEGACY SALE W/O NAME
10101025	27.0	1980	FS	66533	LEGACY SALE W/O NAME
10101026	10.0	1980	FS	66533	LEGACY SALE W/O NAME
10101030	14.0	1980	FS	66533	LEGACY SALE W/O NAME
10101033	23.0	1980	FS	66533	LEGACY SALE W/O NAME
10101035	30.0	1980	FS	66533	LEGACY SALE W/O NAME
10101036	13.0	1980	FS	66533	LEGACY SALE W/O NAME
10101088	44.0	1980	FS	66533	LEGACY SALE W/O NAME

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10101700	45.0	1980	PVT		
10101725	143.0	1980	PVT		
10101729	277.0	1980	PVT		
10201019	58.0	1980	FS		
10201020	45.0	1980	FS		
10201022	32.0	1980	FS		
10201026	34.0	1980	FS		
10201083	31.0	1980	FS		
10201100	50.0	1980	FS		
10201101	55.0	1980	FS	66536	LEGACY SALE W/O NAME
10201151	37.0	1980	FS		
10201229	24.0	1980	FS		
10201230	20.0	1980	FS		
10201231	12.0	1980	FS	66536	LEGACY SALE W/O NAME
10201234	15.0	1980	FS		
10201235	15.0	1980	FS		
10201243	18.0	1980	FS		
10205020	39.0	1980	FS		
10205031	170.0	1980	FS		
10206030	10.0	1980	FS		
10206061	24.0	1980	FS		
10402700	36.0	1980	PVT		
10403700	25.0	1980	FS		
10501700	115.0	1980	FS		
10201017	61.0	1981	FS	66536	LEGACY SALE W/O NAME
10201018	46.0	1981	FS	66536	LEGACY SALE W/O NAME
10201024	18.0	1981	FS	66536	LEGACY SALE W/O NAME
10206069	20.0	1981	FS		
10301011	88.0	1981	FS		
10301018	58.0	1981	FS		
10302035	12.0	1981	FS		
10302036	11.0	1981	FS		
10302037	6.0	1981	FS		
10206196	11.0	1982	FS		
10302011	8.0	1982	FS		
10102001	65.0	1983	FS	83004	BAILEY PASTURE
10102011	132.0	1983	FS	84003	TOOLEY LAKE #2
10102012	42.0	1983	FS	83004	BAILEY PASTURE
10102013	14.0	1983	FS	83004	BAILEY PASTURE
10102014	28.0	1983	FS		
10105003	26.0	1983	FS	84001	TOOLEY LAKE #1
10105007	31.0	1983	FS	84001	TOOLEY LAKE #1
10105013	38.0	1983	FS	84001	TOOLEY LAKE #1
10105014	12.0	1983	FS	84001	TOOLEY LAKE #1
10105015	9.0	1983	FS		
10105016	19.0	1983	FS	84001	TOOLEY LAKE #1
10105017	26.0	1983	FS	84001	TOOLEY LAKE #1
10206183	24.0	1983	FS	66577	LEGACY SALE W/O NAME

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10304003	27.0	1983	FS		
10401002	41.0	1983	FS		
10401008	38.0	1983	FS		
10401031	62.0	1983	FS		
10502014	106.0	1983	FS		
10104003	62.0	1984	FS	66691	LEGACY SALE W/O NAME
10201021	32.0	1984	FS		
10201023	29.0	1984	FS		
10201030	56.0	1984	FS	66530	LEGACY SALE W/O NAME
10501003	68.0	1984	FS		
		Intermediate Harvest 1985-1994			
10101715	150.0	1985	PVT		
10101719	#####	1985	PVT		
10101724	85.0	1985	PVT		
10101727	127.0	1985	PVT		
10102701	10.0	1985	FS		
10102702	26.0	1985	FS		
10104700	80.0	1985	PVT		
10201012	17.0	1986	FS		
10204008	189.0	1988	FS		
10301700	67.0	1988	PVT		
10302032	29.0	1989	FS		
10302033	19.0	1989	FS		
10302095	9.0	1989	FS		
10201153	25.0	1990	FS	66719	YOUNG CR WINTER RG
10301099	31.0	1990	FS		
10301100	20.0	1990	FS		
10301101	31.0	1990	FS		
10301107	10.0	1990	FS		
10304012	11.0	1990	FS	89117	RED_SALVAGE
10304033	27.0	1990	FS	89117	RED_SALVAGE
10304064	48.0	1990	FS	89117	RED_SALVAGE
10304065	7.0	1990	FS	89117	RED_SALVAGE
10304066	22.0	1990	FS	89117	RED_SALVAGE
10304072	34.0	1990	FS	89117	RED_SALVAGE
10304081	16.0	1990	FS	89117	RED_SALVAGE
10503700	57.0	1990	PVT		
10302030	37.0	1991	FS	92111	MARIAS_WEST_P_C
10302051	30.0	1991	FS	92111	MARIAS_WEST_P_C
10101021	52.0	1993	FS	66733	GREEN BASIN-DF
10101022	18.0	1993	FS	66733	GREEN BASIN-DF
10101023	24.0	1993	FS		
10101024	43.0	1993	FS	66733	GREEN BASIN-DF
10101031	8.0	1993	FS	66733	GREEN BASIN-DF
10101032	15.0	1993	FS	66733	GREEN BASIN-DF
10101041	13.0	1993	FS	66733	GREEN BASIN-DF
10101054	10.0	1993	FS	66733	GREEN BASIN-DF
10101055	8.0	1993	FS		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10101056	18.0	1993	FS		
10101057	12.0	1993	FS		
10201145	25.0	1993	FS	66662	YOUNG 303-AF
10301094	23.0	1993	FS	93116	DODGE_HELICOPTER_PC
10301096	29.0	1993	FS	93116	DODGE_HELICOPTER_PC
10301097	20.0	1993	FS	93116	DODGE_HELICOPTER_PC
10301103	58.0	1993	FS	93116	DODGE_HELICOPTER_PC
10301105	29.0	1993	FS	93116	DODGE_HELICOPTER_PC
10301123	8.0	1993	FS	93116	DODGE_HELICOPTER_PC
10301129	8.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302010	31.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302038	8.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302040	1.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302043	39.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302045	4.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302053	24.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302066	10.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302067	34.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302069	17.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302070	30.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302071	16.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302072	4.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302074	35.0	1993	FS	93116	DODGE_HELICOPTER_PC
10302077	6.0	1993	FS	93116	DODGE_HELICOPTER_PC
10304075	63.0	1993	FS	66736	RED MOUNTAIN-AF
10501009	31.0	1993	FS	66737	POVERTY PIT-DF
10501038	21.0	1993	FS	66737	POVERTY PIT-DF
10603006	76.0	1993	FS	66736	RED MOUNTAIN-AF
10101037	25.0	1994	FS	94148	GREEN BASIN FUELBRK
10304063	27.0	1994	FS	92149	CLINGBACK BLOWDOWN
10603139	46.0	1994	FS	92149	CLINGBACK BLOWDOWN
Intermediate Harvest 1995-2004					
10101716	41.0	1995	PVT		
10101034	10.0	1996	FS	93130	GREEN_BASIN
10101047	14.0	1996	FS	93130	GREEN_BASIN
10102002	15.0	1996	FS		
10102003	72.0	1996	FS		
10102004	36.0	1996	FS		
10102006	32.0	1996	FS		
10102007	15.0	1996	FS		
10102008	32.0	1996	FS		
10102021	24.0	1996	FS		
10204003	37.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205018	37.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205019	31.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205022	46.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205025	30.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205026	8.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10205027	7.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205028	17.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205030	49.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205046	36.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205047	13.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205050	20.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205052	8.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10205068	40.0	1996	FS	95103	ROBIN_BOUNDARY_PC
10206009	14.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206010	25.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206029	41.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206031	26.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206034	26.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206037	51.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206038	8.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206039	36.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206040	68.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206043	43.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206048	25.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206049	65.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206053	51.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206055	72.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206056	65.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206063	12.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206066	15.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206068	52.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206070	10.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206071	40.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206073	27.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206076	41.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206080	28.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206083	13.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206112	27.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206119	11.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206120	22.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206121	14.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206122	21.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206123	9.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206124	14.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206132	8.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206137	16.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206152	24.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10206173	28.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206186	3.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206193	8.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206197	18.0	1996	FS	94117	SOUTH_YOUNG_LP_SALVA
10206202	12.0	1996	FS	95121	MOUNTAIN_SALVAGE_PC
10503024	20.0	1996	FS	96121	DODGE_CREEK_FUELS

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10503025	15.0	1996	FS	96121	DODGE_CREEK_FUELS
10503026	28.0	1996	FS	96121	DODGE_CREEK_FUELS
10603063	95.0	1996	FS	94149	KLINGON BLOWDOWN SST
10206051	29.0	1997	FS	95121	MOUNTAIN_SALVAGE_PC
10206067	28.0	1997	FS	95121	MOUNTAIN_SALVAGE_PC
10206138	27.0	1997	FS	95121	MOUNTAIN_SALVAGE_PC
10206139	35.0	1997	FS	95121	MOUNTAIN_SALVAGE_PC
10201110	51.0	1998	FS	97127	BC VIEW LP SALVAGE S
10201114	101.0	1998	FS	97126	DESPERATION LP SALVA
10201117	25.0	1998	FS	97126	DESPERATION LP SALVA
10201128	27.0	1998	FS	97128	CANUCK LP SALVAGE SS
10201253	17.0	1998	FS	97128	CANUCK LP SALVAGE SS
10204038	14.0	1998	FS	95118	NORTH_YOUNG_SALVAGE
10301030	25.0	1998	FS	97121	RANGER_HUNT_SALVAGE
10301121	17.0	1998	FS	97121	RANGER_HUNT_SALVAGE
10302097	18.0	1998	FS	97119	SUMMIT_SALVAGE
10304008	61.0	1998	FS	97121	RANGER_HUNT_SALVAGE
10201011	4.0	1999	FS	98108	YOUNG PUNK BLOWDOWN
10201035	55.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201059	38.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201118	31.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201119	55.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201127	56.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201131	7.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201154	23.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201168	33.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201171	24.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201173	10.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201200	15.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201204	5.0	1999	FS	98108	YOUNG PUNK BLOWDOWN
10201209	12.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201249	10.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201255	14.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201256	83.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201257	32.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201259	57.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10201263	6.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10204025	46.0	1999	FS	95118	NORTH_YOUNG_SALVAGE
10301055	17.0	1999	FS	97121	RANGER_HUNT_SALVAGE
10301056	29.0	1999	FS	97121	RANGER_HUNT_SALVAGE
10105001	82.0	2000	FS	98105	YOUNG BLOCK B FUELS
10105011	21.0	2000	FS	98105	YOUNG BLOCK B FUELS
10105012	28.0	2000	FS	98105	YOUNG BLOCK B FUELS
10105022	16.0	2000	FS	98105	YOUNG BLOCK B FUELS
10201130	22.0	2000	FS	95118	NORTH_YOUNG_SALVAGE
10105002	35.0	2001	FS	99102	ALKALI FUELS SSTS
10105005	80.0	2001	FS	99102	ALKALI FUELS SSTS
10105008	30.0	2001	FS	99102	ALKALI FUELS SSTS

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10105010	26.0	2001	FS	99102	ALKALI FUELS SSTS
10105024	5.0	2001	FS	99102	ALKALI FUELS SSTS
10501004	28.0	2001	FS	01104	POVERTY REHAB
10102016	34.0	2002	FS	01105	DUCK POND REHAB
10102018	9.0	2002	FS	01105	DUCK POND REHAB
10103018	23.0	2002	FS	01105	DUCK POND REHAB
10103029	27.0	2002	FS	01105	DUCK POND REHAB
10105006	30.0	2002	FS	99102	ALKALI FUELS SSTS
10201032	55.0	2002	FS		
10501036	26.0	2002	FS	01104	POVERTY REHAB
10502022	10.0	2002	FS	01106	C BRANCH TS
10502023	140.0	2002	FS	01106	C BRANCH TS
10502037	39.0	2002	FS	01106	C BRANCH TS
10502038	12.0	2002	FS	01106	C BRANCH TS
10502039	12.0	2002	FS	01106	C BRANCH TS
10502040	23.0	2002	FS	01106	C BRANCH TS
10502044	4.0	2002	FS	01106	C BRANCH TS
10502046	43.0	2002	FS	01106	C BRANCH TS
10503009	19.0	2002	FS	01106	C BRANCH TS
10503019	25.0	2002	FS	01106	C BRANCH TS
10503027	27.0	2002	FS	01105	DUCK POND REHAB
10503029	43.0	2002	FS	01106	C BRANCH TS
10503049	9.0	2002	FS	01106	C BRANCH TS
10201252	6.0	2003	FS	02105	YOUNG J FIRE SALVAGE
10501035	31.0	2003	FS	01104	POVERTY REHAB
10104021	161.0	2004	FS		
10201247	19.0	2004	FS	02105	YOUNG J FIRE SALVAGE

Commercial Thin

Commercial Thin 1995-2004

10201083	31	1995	FS
10102003	49	1999	FS
10102004	28	1999	FS
10102006	32	1999	FS
10102007	15	1999	FS
10102008	32	1999	FS
10102009	7	1999	FS
10102010	29	1999	FS
10102011	39	1999	FS
10102014	28	1999	FS
10102016	34	1999	FS
10102017	22	1999	FS
10102021	24	1999	FS
10103001	163	2002	FS
10105004	98	2002	FS
10105007	31	2002	FS
10501002	44	2004	FS

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10501011	37	2004	FS		
10401012	1	2005	FS		
10502050	12	2005	FS		
Pre-Commercial Thin					
Pre-Commercial Thin pre-1975					
10101002	28	FS	1958		
10101003	8	FS	1958		
10503009	19	FS	1960		
10101006	21	FS	1961		
10101030	14	FS	1961		
10101008	76	FS	1962		
10102003	49	FS	1962		
10102001	65	FS	1965		
10102006	32	FS	1965		
10102002	15	FS	1969		
10105006	43	FS	1969		
10501003	68	FS	1969		
10502003	65	FS	1969		
10105002	35	FS	1970		
10503001	85	FS	1970		
10101010	18	FS	1971		
10101019	27	FS	1971		
10105005	83	FS	1971		
10104004	20	FS	1972		
10104007	39	FS	1972		
10104010	54	FS	1974		
10105003	26	FS	1974		
10301004	69	FS	1974		
10302003	46	FS	1974		
10401008	25	FS	1974		
10401010	23	FS	1974		
10402003	80	FS	1974		
10402008	36	FS	1974		
10501002	44	FS	1974		
10502001	95	FS	1974		
10503004	127	FS	1974		
Pre-Commercial Thin 1975 - 1984					
10301034	8	FS	1975		
10302004	21	FS	1975		
10401003	26	FS	1975		
10401004	30	FS	1975		
10401005	36	FS	1975		
10402001	44	FS	1975		
10201002	60	FS	1976		
10201003	21	FS	1976		
10201004	24	FS	1976		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10201006	39	FS	1976		
10201007	28	FS	1976		
10201009	24	FS	1976		
10201012	17	FS	1976		
10502009	27	FS	1976		
10502010	13	FS	1976		
10301002	63	FS	1977		
10302006	65	FS	1977		
10402002	14	FS	1977		
10301005	10	FS	1978		
10201014	40	FS	1980		
10201010	30	FS	1981		
10301003	21	FS	1981		
10302001	43	FS	1981		
10302002	37	FS	1981		
10303010	34	FS	1981		
10103008	52	FS	1982		
10201008	41	FS	1982		
10204004	18	FS	1982		
10206001	49	FS	1982		
10403005	45	FS	1982		
10502004	32	FS	1982		
10503002	70	FS	1982		
10104001	72	FS	1983		
10104013	11	FS	1983		
10104014	9	FS	1983		
10104015	3	FS	1983		
10104016	3	FS	1983		
10104017	2	FS	1983		
10201001	36	FS	1983		
10204005	15	FS	1983		
10204042	49	FS	1983		
10302005	53	FS	1983		
10103012	47	FS	1984		
10104018	2	FS	1984		
10104026	6	FS	1984		
10301001	38	FS	1984		
10502005	47	FS	1984		
		Pre-Commercial Thin 1985 - 1994			
10104011	18	FS	1985		
10201015	28	FS	1985		
10206002	16	FS	1985		
10403003	35	FS	1985		
10205001	35	FS	1986		
10503006	102	FS	1986		
10201005	20	FS	1987		
10201013	39	FS	1987		
10201042	18	FS	1987		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10201050	8	FS	1987		
10201052	23	FS	1987		
10201053	19	FS	1987		
10201054	30	FS	1987		
10201055	19	FS	1987		
10201056	36	FS	1987		
10201070	13	FS	1987		
10205006	192	FS	1989		
10303001	149	FS	1989		
10302007	21	FS	1990		
10201046	27	FS	1991		
10201065	26	FS	1991		
10302022	19	FS	1991		
10302023	40	FS	1991		
10301012	35	FS	1992		
10302026	15	FS	1992		
10401002	35	FS	1992		
10201039	19	FS	1993		
10201040	9	FS	1993		
10201043	21	FS	1993		
10201067	9	FS	1993		
10206016	20	FS	1993		
10206017	41	FS	1993		
10206018	40	FS	1993		
10206019	16	FS	1993		
10206020	42	FS	1993		
10206021	43	FS	1993		
10301142	6	FS	1993		
10403001	20	FS	1993		
10403002	33	FS	1993		
10201048	24	FS	1994		
10201076	19	FS	1994		
10201082	19	FS	1994		
10201093	28	FS	1994		
10201094	5	FS	1994		
10302016	29	FS	1994		
10302017	24	FS	1994		
10302018	40	FS	1994		
10302019	38	FS	1994		
		Pre-Commercial Thin 1995 - 2004			
10201041	28	FS	1995		
10201045	30	FS	1995		
10201051	3	FS	1995		
10201063	9	FS	1995		
10201066	6	FS	1995		
10201103	21	FS	1995		
10206006	111	FS	1995		
10206014	34	FS	1995		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10206022	14	FS	1995		
10301146	6	FS	1995		
10201044	14	FS	1996		
10201049	12	FS	1996		
10201057	9	FS	1996		
10206130	7	FS	1996		
10301013	20	FS	1996		
10301072	4	FS	1996		
10301078	5	FS	1996		
10301080	6	FS	1996		
10301081	4	FS	1996		
10301083	5	FS	1996		
10201080	26	FS	1997		
10206062	32	FS	1997		
10206072	50	FS	1997		
10301014	46	FS	1997		
10301082	1	FS	1997		
10301084	2	FS	1997		
10302020	16	FS	1997		
10302021	31	FS	1997		
10302034	26	FS	1997		
10302056	12	FS	1997		
10403031	2	FS	1997		
10301011	88	FS	1998		
10301016	15	FS	1998		
10301079	3	FS	1998		
10403032	14	FS	1998		
10201058	1	FS	1999		
10201058	1	FS	1999		
10201058	1	FS	1999		
10201058	2	FS	1999		
10201058	1	FS	1999		
10201058	1	FS	1999		
10201058	2	FS	1999		
10201139	8	FS	1999		
10201140	7	FS	1999		
10201047	4	FS	2001		
10201062	22	FS	2001		
10201064	22	FS	2001		
10201135	24	FS	2001		
10201136	19	FS	2001		
10201137	21	FS	2001		
10201138	7	FS	2001		
10201150	20	FS	2001		
10301010	15	FS	2001		
10301029	11	FS	2001		
10105004	98	FS	2003		
10105008	64	FS	2003		

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
10105013	38	FS	2003		
10201024	18	FS	2004		
10301110	11	FS	2004		
10402039	13	FS	2004		
10403027	4	FS	2004		
		Pre-Commercial Thin 2005 - present			
10201155	41	FS	2005		
10206180	28	FS	2005		
10301120	15	FS	2005		
10301135	8	FS	2005		
10201091	20	FS	2006		
10301020	55	FS	2006		
10301111	57	FS	2006		
10501008	19	FS	2007		
			Prescribed Burn		
		Prescribed Burn pre-1975			
	165	FS	1970		
		Prescribed Burn 1975- 1984			
	147	FS	1980		
	179	FS	1982		Tooley Lake
		Prescribed Burn 1985- 1994			
	137	FS	1986		
	35	FS	1989		
	77	FS	1991		
	325	FS	1992		
	131	FS	1992		
	108	FS	1992		
	176	FS	1993		Greens Basin 93
	183	FS	1994		
	147	FS	1994		
		Prescribed Burn 1995- 2004			
	52	FS	1995		
	223	FS	1996		
	5	FS	1996		
	84	FS	1997		
	99	FS	1997		
	56	FS	1997		
	121	FS	1997		
	256	FS	1998		Douglas Hill
	230	FS	1999		
	108	FS	1999		additional
	75	FS	1999		additional
	123	FS	1999		additional
	157	FS	1999		additional
	163	FS	1999		additional
	22	FS	1999		additional

STAND	Acres	Year Accomplished	Ownership	Sale #	Sale Name
	92	FS	1999		additional
	201	FS	1999		additional
	104	FS	1999		additonal
	42	FS	1999		additonal
	162	FS	1999		addtional
	82	FS	1999		Simons 8000
	221	FS	1989/1998		Douglas Hill

APPENDIX 6

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APPENDIX 7

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APPENDIX 8

Recent History of Grizzly Bear Management Strategies on the KNF

Origin of Habitat Measurement Parameters used for the Young Dodge PSU grizzly bear analysis

In July 1994, the Interagency Grizzly Bear Committee (IGBC) issued a Task Force Report which directed the IGBC subcommittees from each recovery zone to develop recommended parameters for road densities and core habitat using the best biological information and considering the social and economic impacts. In July 1995, the USFWS issued an amended Biological Opinion (BO) and Incidental Take Statement on the KNF and LNF Forest Plans (USDI 1995).

The Selkirk/Cabinet-Yaak Subcommittee chartered the Access Management Task Group in July 1996. The Task Group was directed to complete access recommendations by January 1997. This Task Group met nearly monthly for well over a year. The Task Group used research by local grizzly bear research scientists, Wayne Kasworm (USFWS) and Wayne Wakkinen (Idaho Dept of Fish and Game [IDFG]), held several public meetings to discuss the research and understand the social concerns, and completed an effects analysis looking at the social and management impacts to implementing a new access strategy. The Access Management Task Group presented the final effects analysis to the Subcommittee in February 1998 (Wakkinen and Kasworm 1997). These recommendations are also referred to as the "Rule Set".

The Subcommittee put together an Implementation Group to determine how the Forests would proceed with the implementation of the new Rule Set. In September 1998, the Subcommittee decided to implement "interim" guidelines to be in place for three years and/or until Forest Plan revisions were completed. The Subcommittee approved the Interim Access Rule Set in December 1998 (Selkirk Cabinet-Yaak Subcommittee of the IGBC 1998) and began implementation in January 1999.

Effects analysis on for the Young Dodge Project considers the recovery objectives, compliance with management direction, and best science. Table 1 describes the recovery objective, the habitat parameters evaluated, and the origin of the habitat parameters.

Yound Dodge DSEIS Appendix 8 Table 1. Recovery Objectives, Parameters, and Basis Guiding Grizzly Bear Habitat Analysis

Objective*	Parameter	Origin of Parameter
1. Provide adequate space to meet the spatial requirements of a recovered grizzly bear population.	a. Habitat effectiveness b. Core areas c. OMRD d. TMRD e. Linear road density	a. Recommendation from Christensen and Madel (1982) b. FP standard (III-59 and Appendix 8-10); 1995 BO term and condition; and recommendation from Wakkinen and Kasworm (1997) c. 1995 BO term and condition; and recommendation from Wakkinen and Kasworm (1997) d. 1995 BO term and condition; and recommendation from Wakkinen and Kasworm (1997) e. FP standard (Appendix 8-12), McMaster 1995
2. Manage for an adequate distribution of bears across the ecosystem.	a. Opening size b. Movement corridor c. Seasonal components d. Road density and displacement (Core)	a. Recommendation from Grizzly Bear Guidelines meeting (Harms 1990) b. FP standard (III-59 and Appendix 8-10) c. FP standard (Appendix 8-10); and recommendations from USFWS and KNF meeting (Brooks 1992) d. See Objective 1
3. Manage for an acceptable level of mortality risk.	a. Opening size b. Movement corridors c. Road density d. Displacement e. Attractants	a. See Objective 2 b. See Objective 2 c. See Objectives 1 and 6 d. See Objectives 1 and 6 e. FP standard (Appendix 8-9, 11, 12, 14, and 16)
4. Maintain/improve habitat suitability with respect to bear food production	a. Objectives 1 and 2 b. How does project improve food sources (especially huckleberries)	
5. Meet the management direction outlined in the Interagency Grizzly Bear Guidelines (51 Federal Register 42863) for management situations 1, 2, and 3.	Achieved by meeting Objectives 1-4	
6. Meet the interim management direction specified in the July 27, 1995, Incidental Take Statement (McMaster 1995).	a. Open road density b. Open motorized trail density c. Total motorized access route density d. Existing Core area size	All – Reasonable and Prudent Measures in 1995 BO, see Objective 1.

*Objectives 1-5 were formulated to accomplish the KNF grizzly bear management goal to provide sufficient quantity and quality of habitat to facilitate grizzly bear recovery (Harms 1990).

As noted in Table 1, several parameters are based on recommendations found in Wakkinen and Kasworm (1997). These recommendations are: 1) a minimum Core habitat of 55%, 2) a maximum of 33% of BMU with greater than 1 mile per square mile open motorized route density (OMRD), and 3) a maximum of 26% of BMU with greater than 2 miles per square mile of total motorized route density (TMRD).

The Wakkinen Study applied research techniques from Mace and Manley (1993) and Mace and Waller (1997) to local bear populations in the Selkirk and Cabinet-Yaak Ecosystems (SCYE). The Wakkinen Study was peer reviewed by nine biologists, whose comments were incorporated in the final report. A detailed explanation of the limitations of the Wakkinen Study is discussed in Appendix 9 of this document. Wayne Kasworm, grizzly bear researcher with the USFWS, and Wayne Wakkinen, grizzly bear researcher with the Idaho Department of Fish and Game, have over thirty years of experience monitoring grizzly bear populations in the SCYE.

Timeline of Litigation / Controversy over Grizzly Bear Management Strategies for SCYE and its affect on the Young Dodge PSU grizzly bear analysis

In the spring of 1999, the Alliance for the Wild Rockies filed a lawsuit challenging the Kootenai and Idaho Panhandle National Forests implementation of the Interim Rule Set without amending their Forest Plans. The Forests settled the lawsuit in March 2001, and agreed to amend their respective Forest Plans to address grizzly bear access management. Soon following, the USFWS issued an amended BO and Incidental Take Statement on the IPNFs Forest Plan in April of 2001 (USDI Fish and Wildlife Service 2001a).

The following March of 2002, the FS issued a final Environmental Impact Statement (EIS) for amending access standards to the Forest Plans for the KNF, IPNFs, and LNF (USDA Forest Service 2002a). And in May 2002, the Biological Assessment (BA) was sent to the USFWS (USDA Forest Service 2002b). This document used 2000 data for its baseline information in the individual Bear Management Units (BMUs).

Meanwhile, by 2002, agency biologists recognized that grizzly bears were occurring and sometimes living in areas outside of established grizzly bear recovery zones and warranted some level of management consideration. Biologists from federal and state agencies and Native American Tribes with jurisdiction over grizzly bear or their habitat met and identified areas where one would reasonably expect to find grizzly bear use occurring during any / most years. The data used to identify these areas were female and cub monitoring data, nuisance bear activity, radio locations, and creditable observations from the past 5-10 years (from 2002).

By March of 2003, the KNF LNF, and IPNF responded to this new information (Johnson, unpubl. rept. March 2003), in cooperation with the USFWS. Each Forest was asked to determine an estimate of bear numbers, analyze habitat conditions relative to linear open and total road densities on eight very large analysis areas (also referred to “Bears Outside the Recovery Zone” or “BORZ” polygons), analyze food attractant and storage problems in each analysis area, and evaluate conflicts between grizzly bear and livestock grazing in each area. In addition, the analysis had displayed all steps to minimize “incidental take” based on existing management direction.

In February 2004, the USFWS produced a BO in response to the BA for the Access Amendment. The BO presented the baseline in the BMUs using more recent 2002 information supplied by the KNF, IPNFs, and LNF. By March of 2004, the Record of Decision for the Access Amendment EIS was signed which amended the Forest Plans for the three forests. The 2004 BO also contained terms and conditions and an incidental take statement for grizzly bears outside of recovery zones in the specific BORZ polygons previously mentioned.

Two subsequent lawsuits against the Forest Service and USFWS in November and December of2004 resulted in one favorable ruling for the Forest Service from the Montana District Court in August of 2006. However, the District Court ruled against the Forest Service in December of 2006 on one issue and remanded the case back to the Forest Service for preparation of a new environmental analysis. That 2006 ruling effectively removed the habitat parameter standards established in the March 2004 FS decision. This meant that the standards in place prior to the 2004 Access Amendment again became the applicable Forest Plan standards. These standards will remain in place until a new final Access Amendment EIS and ROD are completed. The USFWS subsequently withdrew its BO in May of 2007.

Since 2007 a Level One team of Idaho Panhandle, Lolo, and Kootenai National Forests, and USFWS personnel have met regularly to create a supplemental EIS for the 2004 Access Amendment. In the summer and fall of 2009, the Forest Service and USFWS re-analyzed the original 2002 BORZ delineation in order to utilize the best available information for the final Access Amendment SEIS and clarified how the delineation was completed in terms of available biological information, and boundary delineation. The Level One team identified a process for determining recurring use areas for grizzly bears, including developing criteria for the observations that would qualify for use in determining occupied BORZ polygons. The criteria include multiple individuals, females with cubs, multiple years of use, and radio-locations (Grizzly Bear Access Amendment-Recurring Use Area Delineation, September 28, 2009 notes). At a subsequent meeting the team decided to define a time frame for valid grizzly observations of 15 years or less (Access Amendment Level One Meeting Agenda, 3/1/2010).

This re-analysis of the KNF BORZs resulted in minor boundary changes to the previously existing West Kootenai BORZ in which the Young Dodge PSU is a part. These slight boundary changes occurred around privately owned lands in the West Kootenai community. No status changes for the West Kootenai BORZ, such as grizzly bear use levels, resulted from the re-analysis of the KNF BORZs, thus there were no subsequent changes necessary for the grizzly bear analysis conducted for the Young Dodge PSU DSEIS.

APPENDIX 9

APPENDIX 9

LIMITATIONS OF THE WAKKINEN STUDY

Introduction

The ESA requires federal agencies to base their actions on the use of best scientific and commercial data available [16 U.S.C. 1536(a) (2)]. The best available scientific information regarding access management in grizzly bear habitat is considered to include two primary sources. One of these is the information gathered from research of the South Fork of the Flathead River regarding how road access affects grizzly bears (Mace and Manley 1993, Mace and Waller 1997). This research resulted in development of OMRD, TMRD, and Core area as management measures for ensuring grizzly bear habitat security for the Northern Continental Divide Ecosystem (NCDE) Grizzly Bear Recovery Area. The second source is research from local bear populations that applies the South Fork of the Flathead River research techniques to the Selkirk and Cabinet-Yaak Recovery Zones (Wakkinen and Kasworm 1997). The Wakkinen and Kasworm report (1997) was peer reviewed by nine biologists, whose comments were incorporated in the final report. Wayne Kasworm, grizzly bear researcher with the USFWS, and Wayne Wakkinen, grizzly bear researcher with the IDFG, have over 30 years of experience monitoring grizzly bear populations in the recovery zones. This research resulted in development of OMRD, TMRD, and Core area as management measures for ensuring grizzly bear habitat security for the Selkirk/Cabinet-Yaak Grizzly Bear Recovery Areas.

The Interagency Grizzly Bear Committee (IGBC) recommended that information on OMRD, TMRD, and Core area be incorporated into the management of grizzly bears and that each grizzly bear ecosystem develop ecosystem-specific guidelines using local data where possible (IGBC 1998). Based on the IGBC's recommendation, the Forest Service and USFWS reviewed research from the South Fork Flathead study (Mace and Manley 1993) and the Selkirk/Cabinet-Yaak study (Wakkinen and Kasworm 1997). The research data from radio-collared grizzly bears in the Selkirk/Cabinet-Yaak Ecosystems was used to determine the appropriate levels of these three parameters (Wakkinen and Kasworm 1997). These numbers were generated with local data, which the Forest Service and the USFWS considers the best available local information (see 2002 FEIS, pages 4-29 and 30, and Johnson 2007a).

A detailed look at Wakkinen and Kasworm (1997), a review of other applicable grizzly bear management scientific studies (Johnson 2007a), and a review of other applicable science was completed. The following discussion discloses the limitations of the Wakkinen Study:

1. **The study authors (Wakkinen and Kasworm 1997), were uncertain whether the bears they studied had chosen optimal habitat or whether they simply chose the best available habitat; and assess the relevance and importance of this uncertainty.**

   Wakkinen and Kasworm did not assess if grizzly bears selected home ranges with fewer roads relative to road densities across the Selkirk/Cabinet-Yaak Ecosystem because a detailed route map was not available for the entire ecosystem. Instead, this study determined bear use of areas greater or lesser than expected within existing home ranges relative to access route density (i.e., third order selection). Because of this, it is not possible to conclude whether the 33 percent OMRD, 26 percent TMRD, and 55 percent Core area conditions in the Selkirk/Cabinet-Yaak Ecosystem represent the optimal selection of habitat by bears or if these numbers simply reflect the condition of the environment from which they have to choose (i.e., do bears in either ecosystem have the opportunity to choose areas with less road density or more Core area?). However, in examining the juxtaposition of the four Selkirk study animal home ranges, it is apparent that wilderness areas (Salmo Priest) and roadless areas were available for use by grizzly bears but were not incorporated into their home ranges for the duration of the study. In addition, seasonal habitat selection of preferred habitats in relation to roads was not completed in the 1997 research due, in part, to small sample sizes and availability of data. Wakkinen and Kasworm (1997) recommend that the proximity of quality or limited habitat be considered when defining road closures. Subsequent graduate work using the 1989-1991 Selkirk data was recently completed (Sloan 2008), but the value of the resource selection modeling does not reflect more recent grizzly bear habitat use. This is particularly true for the spring season (Wakkinen pers. comm. 2009).

Despite the uncertainty as to why individual bears in these studies selected the habitat they did, it can be reasonably concluded that areas of lower road densities or providing higher amounts of Core area does not necessarily guarantee lower mortality rates. Two of the bears sampled in the Wakkinen and Kasworm (1997) study died from human causes after the study was complete. One died more than two miles behind a gated road in an area of low open road density[1] and the second was killed in a Core area. Likewise, Mace et al. (1996) revealed the death of eight marked grizzly bears by humans in the Northern Continental Divide Ecosystem study area, with Mace and Waller (1998) documenting mortality rates that were 15 times higher for bears using the wilderness area than for bears using only multiple-use lands in the same study area. Ultimately, the desired habitat conditions are those that are conducive to producing survivors, which contribute toward recovery (e.g., produce offspring that produce offspring). In the case of the Wakkinen and Kasworm study, multiple offspring have been identified as progeny from the Yaak study area adult female 106 (i.e., female offspring 206, 303, and 353) (Kasworm et al. 2009). All three of these female offspring are known to have produced cubs between 1994 and 2002 (ibid), and there is circumstantial evidence that an additional female offspring bear, bear 354[2], also survived and produced cubs (Kasworm 2003). One of these, female 206, was also part of the 1997 road study. In addition, Selkirk study females 867 and 1015 are known to have produced offspring that survived to maturity (ibid).

Thus, the relevant question is, whether grizzly bears are successful in producing offspring and survivors that will contribute toward recovery of the species within the respective ecosystem? Recent research from Wakkinen and Kasworm (2004) indicates that survival rates for Selkirk Recovery Zone adult and subadult females and cubs and Cabinet-Yaak Recovery Zone adult females are within the range of rates reported for other interior grizzly bear populations. Conversely, survival rates for Selkirk Recovery Zone yearlings and Cabinet-Yaak Recovery Zone subadult females, yearlings, and cubs fell below survival estimates reported elsewhere (ibid).

2. Misgivings of the USFWS biologist over the 33/26/55 standards.

The USFWS (2004) stated that the average individual home ranges in the Wakkinen and Kasworm report (1997) provided the best available indication of the habitat conditions used by grizzly bears in the Selkirk/Cabinet-Yaak Ecosystem. These values were based on: 1) a high percentage of the total Ecosystem's female grizzly bear population, 2) female grizzly bears that survived to adulthood, and 3) females in the Ecosystem that successfully reproduced.

However, an individual USFWS biologist in the Spokane office expressed a different opinion, regarding the resulting habitat parameter values derived from the individual home range analysis, than that of other USFWS biologists and the agency itself (i.e., 33 percent OMRD, 26 percent TMRD, and 55 percent Core area). The biologist did not concur with the minimum 55 percent Core area suggested by the Selkirk/Cabinet-Yaak Ecosystem Access Task Group. The biologist suggested using an arithmetic mean from the Selkirk/Cabinet-Yaak and North Continental Divide Ecosystem data (i.e., the Flathead National Forest Amendment No. 19--hereafter referred to as Flathead NF Amendment No. 19 (U.S. Forest Service 1994a and 1994b)), without conducting any analysis or considering whether the data was compatible.

[1] This bear was killed by a hunter that walked the two-plus miles behind the closed gate before encountering this female and her two young-of-the-year cubs (Allen and Carr 2009).
[2] Born in 1995 and sibling to 353.

The USFWS has acknowledged these criticisms in the Access Amendment EIS project; combining results from the two research efforts is not appropriate due to significant differences in analysis techniques.

3. **Findings of other studies measuring habitat parameters in other ecosystems.**

The 1997 Wakkinen and Kasworm study was completed using standardized techniques that were developed from research findings for the *South Fork Flathead River Grizzly Bear Project* (Mace and Manley 1993). This research, and its subsequent publications (Mace et al. 1996 and Mace and Waller 1997), and reanalysis for the Flathead National Forest Forest Plan Amendment provide an appropriate study for comparison of the Selkirk/Cabinet-Yaak Ecosystem research.

Sample Sizes: While the sample sizes obtained by Wakkinen and Kasworm (1997) were small (six successful females, including one subadult that became an adult and reproduced during the study), the results were consistent with those found in similar studies conducted in the Northern Continental Divide Ecosystem (Mace and Manley 1993, Mace et al. 1996, and Mace and Waller 1997. These results were based on 9 and 13 female grizzly bears (1993, 1996 and 1997, respectively) and included 5 that were monitored as subadults for a portion of the monitoring period. The reanalysis for the Flathead NF Amendment No. 19 included only seven females in its development of their standards[3]. In addition, the research data for the Northern Continental Divide Ecosystem study (Mace and Manley 1993), like the Wakkinen and Kasworm research data, included at least one female offspring that successfully reproduced (i.e., offspring that produced offspring). Reproduction from offspring is one indication of habitat capable of producing survivors that contribute to potential population increase.

Proctor et al. (2008) describes the trapping difficulty to get a larger sample size in the Purcell Mountain Ecosystem of southeastern British Columbia, Canada, especially for female grizzly bears. Given that the researchers are attempting to study a small population, there is a “paradox that we’re trying to understand and predict use of habitat by females in an ecosystem where they are critically low” (Ibid).

Road Density Parameters: Road density used by female grizzly bears in the Flathead NF Amendment No. 19 reanalysis of seven grizzly bears were lower and bear use of unroaded habitat was higher (USDA Forest Service 1994a, 1994b; USDI Fish and Wildlife Service 1995). However, the highways, county roads, and numerous private property roads were not included in their analysis. These differences in habitat availability and the available roads database would have likely resulted in larger Core areas and smaller OMRDs and TMRDs being reported. Conversely, Mace et al. (1996) reported a Core area of 56 percent unroaded areas which is very close to the Selkirk/Cabinet-Yaak Ecosystem average Core area of 55 percent.

Quantification of Home Range: Both studies used the same software (Calhome) to calculate home ranges based on radio locations of individual bears. However, the Northern Continental Divide and the Selkirk/Cabinet-Yaak Ecosystem studies approached grizzly bear habitat selection in different ways. The Northern Continental Divide Ecosystem parameters (Flathead NF Amendment No. 19; USDA Forest Service 1994a, 1994b) were developed using composite (combined) home range information, rather than the average multi-year individual home range information used by Wakkinen and Kasworm for the Selkirk/Cabinet-Yaak Ecosystem. The Northern Continental Divide Ecosystem study was conducted in a relatively small, contiguous portion of the Northern Continental Divide Ecosystem. Grizzly bear use within this ecosystem resulted in overlapping or adjacent home ranges, so the authors pooled the data into one large "home range" area. These data were used to quantify habitat selection in relation to road densities. In contrast, the Selkirk/Cabinet-Yaak Ecosystem study was conducted over a very large disjunct area of the Selkirk/Cabinet-Yaak Ecosystem. Wakkinen and Kasworm (1997) were unable to pool the home ranges in the same manner as Mace and Manley

[3] 19 percent OMRD, 19 percent TMRD, and 68 percent Core area (USDA Forest Service 1994a and 1994b.

because they were dealing with disjunct or separate study areas with one in the Selkirk Mountain Range and one in the Yaak River valley. As a result, all the bear home ranges were not adjacent or overlapping. Therefore, values from individual bear home ranges were averaged to provide estimates of road densities and Core area.

However, the authors of the Selkirk/Cabinet-Yaak Ecosystem study believe that individual home ranges provide a better description of actual use areas available to bears than a composite home range (Kasworm et al. 2007b). The differences in calculation methods make combining the data difficult, at best, as well as biologically inappropriate. Even Mace et al. (1996) points out that pooling of individuals are not appropriate because resource availability and selection is unique to the individual bears and the individual habitats available to them. Thus, it would have been inappropriate to combine the individual values from the respective Northern Continental Divide and Selkirk/Cabinet-Yaak Ecosystem studies.

Importance of other Habitat Components in Home Range Selection: Mace et al. (1996) and Mace and Waller (1997) point out the importance of other habitat components as determinants of grizzly bear habitat selection. Specifically, their data emphasized that habitats were used primarily because of their attractiveness as a food source and that displacement from roads occurred as a subsidiary element of grizzly bear habitat use (e.g., spring habitat selection near roads in Mace et al. 1996, and Waller et al. unpublished). In addition, food sources differ between the ecosystems. The Northern Continental Divide Ecosystem provides army cutworms and whitebark pine seeds, which are two food sources either not present or not found in large quantity in the Selkirk/Cabinet-Yaak Ecosystem. The physical location of these food sources contributes to habitat selection, which in the case of the Northern Continental Divide Ecosystem study resulted in bears selecting higher elevation areas (typically unroaded or Core areas) where these foods are found.

Wakkinen and Kasworm (1997) did not complete an analysis of habitat selection as part of their research.

More recently, research within the adjacent Purcell Mountain Ecosystem have found results similar to those in the Wakkinen Study. Proctor et al. (2008) examine data for 5 bears in the south Purcell Mountains, which extend into northwestern Montana and shares trans-border bears with the Cabinet-Yaak (CYE) portion of the SCYE. Proctor et al. (2008) did not examine the female grizzly's selection of home range to the whole ecosystem, but did compare it to what was available within their respective BMUs. All 3 successful females selected their individual home ranges with higher Core than available in the BMU, averaging 51% (44, 54, and 55). Even at this higher order of selection, the percent Core is similar (average of 55%, ranging from 40, 53, 53, 54, 55, to 72) to Wakkinen and Kasworm (1997). Open road densities are also similar between the studies, 1.2 km/km2 (0.46 mi/mi2) vs. ≤ 1 mi/mi2 (Proctor et al. 2008 and Wakkinen and Kasworm 1997, respectively). In contrast, 2 unsuccessful females in this ecosystem selected home ranges of only 19% and 29% Core (Proctor et al. 2008).

4. The status of grizzly bear mortality in the Selkirk and Cabinet-Yaak Recovery Zones.

Additional data on grizzly bear mortalities that occurred during and after the time of the Wakkinen and Kasworm paper (1997) is now available. This information is included in the demographics and population trends analysis (Wakkinen and Kasworm 2004) and population mortality trend calculation (Kasworm et al. 2007a) research, and subsequent mortality updates (Kasworm and Allen 2009, Johnson and Allen 2009, Wakkinen and Allen 2009). While the plaintiffs criticized the Wakkinen and Kasworm study (1997) for considering bears that died after the study was completed, the Northern Continental Divide Ecosystem studies (Mace and Manley 1993, Mace et al. 1996, and Mace and Waller 1997) also include data from bears that died during and after the study. Both studies considered information relative to bears that died shortly after the results of the study were determined. These post study mortalities do not change the levels of habitat conditions selected by grizzly bears in either ecosystem. It is not appropriate to conclude from these mortalities that selecting more secure habitat would have prevented these mortalities (as shown by the fact that some grizzly bear mortality occurs in Core areas that are greater than 500 meters from a road in both study areas) or that the habitat conditions proved "lethal" to bears. As suggested by McClellan et al. (2000), a more appropriate analysis to answer this question would be to complete an assessment of home range and habitat use for "successful" and "unsuccessful" bears to see if use patterns were similar or not[4]. As discussed previously, the relationship between habitat and mortality is indirect and habitat does not appear to be a significant factor presently in mortality of grizzly bears in the Selkirk/Cabinet-Yaak Ecosystem.

[4] McClellan et al. 2000 provided a peer review of the South Fork Flathead River research and made the following observation, "If the 'unsuccessful' females had home range and areas of use different from 'successful' females, then the characteristics of the successful females' ranges may be considered sufficient as the basis for conservation planning. However, if the home ranges and habitat use patterns were similar, but some were just luckier or more skilled at avoiding people within their range, then the 'lucky to be successful' females may not be suitable as the basis for conservation planning. If the successful females lived in more secure areas than unsuccessful females, then it would be assumed they needed that level of security to be successful: perhaps they could have done fine with less security. Without comparing the range locations and habitat use of bears with varying levels of success "then the question of whether bears from the Swan Valley study can form the basis of a conservation strategy" remains unanswered.

A Review of the Wakkinen and Kasworm (1997) Report as Best Available Science for the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones

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Introduction

The purpose of this paper is to provide a comprehensive review of the Wakkinen and Kasworm (1997) report and compare their effort with the South Fork Flathead River research conducted by Richard Mace and others in the late 1980s and early 1990s. This updates and supersedes the Johnson (2007) review.

The 1997 Wakkinen and Kasworm report provides the only available science specific to the Selkirk and Cabinet-Yaak Ecosystems (SE and CYE) for setting motorized access standards. This research was completed in response to the 1994 Interagency Grizzly Bear Committee (IGBC) direction (IGBC 1994) to develop site-specific habitat security parameters using local female bears in regards to motorized access in all grizzly bear recovery zones. In 1998 and 1999, the Selkirk/Cabinet-Yaak Ecosystem (SCYE) IGBC subcommittee reviewed the Wakkinen and Kasworm (1997) effort which was, in turn, used by the U.S. Fish and Wildlife Service (USFWS) as the "best available indication of habitat conditions used by grizzly bears in the Selkirk and Cabinet-Yaak Ecosystems" in completing their 2001 amended Biological Opinion regarding the continued implementation of the Idaho Panhandle National Forest Plan (USDI Fish and Wildlife Service 2001). To date, there are no other analyses quantifying these parameters using local grizzly bear data for these two ecosystems.

However, since the issuance of this report 14 years ago, there has been an on-going debate as to its merits and limitations. As a result, some have questioned the validity of using the report's conclusions as a basis for developing motorized access standards in these two recovery zones. Critics of the 1997 report specifically point to the following in their disparagement of the results: (1) limited sample size of female grizzly bears; (2) inclusion of a subadult female for portions of the analysis; (3) lack of reproductive success and/or mortality of radio-collared bears after the study was over; (4) the lack of a second-order analysis which would help explain if these bears had the opportunity to select greater levels of unroaded habitat elsewhere in the recovery zone; (5) use of individual multi-annual home ranges versus composite home ranges in the resource selection analysis; and (6) the lack of a minimum core block size in establishing core areas. Many of these comments revolve around comparisons to research completed in the South Fork Flathead River area of the Northern Continental Divide Ecosystem (NCDE) in Montana. The latter provided the basis for development of the motorized access parameters by the IGBC in 1994 (Mace et al. 1993, IGBC 1994, Mace 2004).

The following review explores these six aspects of the research and offers a comparison of the Wakkinen and Kasworm (1997) effort with the various iterations of the Montana Fish, Wildlife, and Parks grizzly bear research completed in the South Fork Flathead River area of the NCDE (Mace and Manley 1993, Mace et al. 1996, Manley and Waller 1997 and 1998) and its application in the Flathead National Forest amendment to their Forest Plan in 1995 (USDA Forest Service 1994a, 1994b, and 1995). Key differences and similarities in the data analysis using a Geographical Information System (GIS) are also reviewed and illustrate why direct comparison between the two research efforts is problematic. Attachment A and B provide summary information on the study bears, biological data, and data analysis used in the Selkirk/Cabinet-Yaak and South Fork Flathead River studies.

Summary of Research and Findings

Mace and Manley (1993): This Montana Fish, Wildlife, and Parks progress report covered the first five years (1987-1992) of a 10-year research project aimed at quantifying grizzly bear population and habitat use on multiple-use lands (i.e., the Flathead National Forest) within the Northern Continental Divide Ecosystem. Their research on bears from the South Fork Flathead River[1] introduced the concept of using a "moving window" analysis in a GIS to quantify Open Motorized Road Density (OMRD) and Total Motorized Road Density (TMRD), as well as defining areas free of motorized access (i.e., "Core" Areas per IGBC 1994). All three of these parameters were subsequently adopted by the Interagency Grizzly Bear Committee as the three primary elements in the management of human access in grizzly bear recovery zones (IGBC 1994 and 1998). They reported a TMRD greater than 2.0 miles per square mile of 18 percent with 46 percent of the home range unroaded for nine adult female grizzlies. A 0.5-*mile* buffer around motorized routes was used to define unroaded habitat. No analysis or recommendation concerning core block size was included in this report.

Flathead National Forest Amendment 19 to the Forest Plan (USDA Forest Service 199S): The Biological Assessment for this Forest Plan Amendment (USDA Forest Service 1994a and 1994b) included a new characterization of a subset of the Mace and Manley (1993) grizzly bear radio telemetry data based on new direction from the IGBC committee and the need to complete consultation on their Forest Plan. This assessment was completed by R. Mace who used seven of the nine grizzly bears and incorporated a 0.5 *kilometer* (or 0.31 mile) buffer around motorized routes in his analysis of core (USDA Forest Service 1994a, 1994b). He used a composite of multi-annual home ranges[2] derived from these seven female grizzlies to determine a OMRD: TMRD: core area standard of 19:19:68 percent (ibid)[3]. The Forest proposed a 55 percent core as the minimum short term standard for implementation based on the smallest percent core observed in one individual female's home range (ibid) and research from the Yellowstone region (Mattson 1993). A minimum core block size of 2,500 acres was suggested in the Biological Assessment. The subsequent Biological Opinion for the Amendment (USDI Fish and Wildlife Service 1995) reported that 83 percent of some proportion of adult female grizzly bear use was in unroaded blocks greater than 2,260 acres in size from the Mace and Manley study, but no sample sizes were disclosed nor was any statistical analysis completed in the Mace and Manley (1993) or Mace and Waller (1997) report to substantiate this, or the 2,500 acre recommendation.

Mace et al. (1996): In this peer-reviewed publication[4], the authors reported their final results concerning the relationship between grizzly bears, habitats, and roads on multiple-use lands in the South Fork Flathead River area. The authors did not provide an update on their 1993 efforts to quantify female grizzly bear use in relation to varying levels of core area, OMRD, and TMRD, but did report habitat use in relationship to overall and roadless area[5] habitat for 13 female grizzlies from 1990-1994. In addition, they investigated grizzly bear response to roads of differing traffic volume. They used a composite multi-annual home range for 13 adult and subadult female grizzly bears[6] to determine that 56 percent of their annual use was in unroaded areas (0 km/km^2) versus the rest of the study area where 30 percent were

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[1] Also referred to as the "Swan Valley" research project by some reviewers

[2] The composite home range for the seven bears was located exclusively on National Forest System (NFS) lands. Furthermore, it did not include any large lakes, private property, MS 3 designated lands, or federal, state, and/or county highways (Allen and Ake pers. comm. 2011b).

[3] A second-order resource selection analysis was not completed on this subset of the original data.

[4] Journal of Applied Ecology

[5] They reported "roadless areas" (road densities of 0 km/km^2) rather than core habitat. A cursory analysis of three Selkirk ecosystem BMUs using ARCInfo and a square window revealed that the amount of BMU within the 0 km/km^2 category underestimates core by approximately five percent on average.

[6] Seven bears were included in the 1990-1994 study effort that were independent subadults when first collared, and five of these were offspring from the original 10 adult female grizzlies used in the Mace and Manley (1993) report (Attachment A).

unroaded. In addition, they used individual seasonal home ranges for as many as 15 male and females grizzly bears to demonstrate that an average of 53, 59, and 62 percent of spring, summer, and fall home ranges, respectively, were unroaded. They emphasized the multivariate nature of grizzly bear habitat selection (i.e., analysis of selection above and beyond just motorized routes[7]) and the need for inclusion of seasonal habitat requirements into road density standards. No analysis concerning core block size was included in this publication.

Mace and Waller (1997): This was the final report for the 10-year South Fork Flathead grizzly bear study. Their report included details on various aspects of grizzly bear biology within the study area as well as the Mace et al. (1996) publication as one of its ten chapters. Our review relies on this document for additional details on the reproductive success and mortality of the South Fork Flathead River study bears. No analysis or recommendation concerning core block size was included in this publication.

Mace and Waller (1998): This peer-reviewed publication[8] included information on the demography, movements, and population trend of grizzly bears in wilderness and non-wilderness portions of the South Fork Flathead River/Swan Mountains. Our review relies on this document for additional details on the mortality trends of the South Fork Flathead River study bears.

Wakkinen and Kasworm (1997): This report was developed at the behest of the SCYE IGBC subcommittee after the release of the 1994 IGBC guidelines[9]. Wakkinen and Kasworm (1997) used data collected from 1989-1991 (Selkirk Recovery Zone) and 1990-1994 (Cabinet-Yaak Recovery Zone) to document an average OMRD greater than 1.0 miles per square mile of 33 percent, a TMRD greater than 2.0 miles per square mile of 26 percent, and an average 55 percent core area for six[10] female grizzly bears using a 0.31 *mile* buffer around motorized routes [11] to describe core area habitat. Four of the six bears sampled had core amounts at or below the 55 percent level (53.3, 53.4, 53.7, and 55.3) with the two remaining bears creating the range (40.0 and 71.5). The authors attempted to determine a minimum core block size but were unsuccessful due to limited sample sizes[12]. This report was peer-reviewed by nine biologists from the U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, U.S. Forest Service, and Washington State University.

[7] This includes variables such as the quality and quantity of habitats in terms of vegetation, elevations, slope, and aspect.

[8] Conservation Biology (journal).

[9] The SCYE IGBC subcommittee appointed a nine-member taskforce to review the research effort and provide critique and input for inclusion into the final product. This included: 1) USDI Fish and Wildlife Service representatives from the Spokane office (S. Audet & M. Aimes), the Helena office (K. Shelley), the Grizzly Bear Recovery Plan Coordinator (Dr. C. Servheen); 2) USDA Forest Service representatives from the Colville National Forest (J. McGowan), Idaho Panhandle National Forest (E. Zieroth), Kootenai National Forest (M. Balboni), and Lolo National Forest (D. Smith); and 3) the two co-authors W. Kasworm and W. Wakkinen (IGBC SCYE 1997).

[10] Five of these bears were 5+ years or older during the study; one bear (bear 206) was 3-4 years old (subadult) for two years of the three years she was tracked.

[11] The multi-annual composite home range for the six bears was not located exclusively on National Forest System (NFS) lands. Rather it included MS 3 designated lands, Idaho state lands, private property, British Columbia provincial lands, and severalfederal, state, and/or county highways. This is different from the situation in the South Fork study where the composite home range was located exclusively on NFS lands and included no federal, state, and/or county highways.

[12] This analyses introduces more sample size limitations than determining statistical preference for core habitat and road density categories because: 1) the available pool of grizzly bear locations is smaller when only core habitat locations are used (about 2/3 of the total number of locations); and 2) a greater number of categories was used to attempt to establish core size preference (six versus four road density categories and two in core/non-core habitat use). Both of these aspects of the analyses reduce statistical power.

Sample Size and Age of Female Grizzly Bears

Research on grizzly bears is limited by the number of study animals that are captured and radio-collared for long-term movement and habitat use analysis. Both Weilgus and Bunnell (1995) and Mace et al. (1996) acknowledged the difficulties in obtaining large sample sizes when studying a low density and highly mobile species like the grizzly bear. Numerous annual reports from the Selkirk and Cabinet-Yaak research efforts attest to the hundreds of hours it takes to trap a single grizzly bear during any given field season (Knick 1988, Wakkinen and Zager 1990, Volson 1994, Kasworm and Manley 1988, Kasworm et al. 2007). Similar efforts were employed in the South Fork Flathead River grizzly bear study (Mace and Waller 1997).

Grizzly bear and black bear researchers captured and radio-collared 50 individual grizzly bears in extensive trapping efforts in the SCYE from 1983 to 1994[13] (Kasworm and Manley 1988, Kasworm et al. 2007, Thier 1990, Wakkinen 1993, Wakkinen and Johnson 2000). Wakkinen and Kasworm's subsequent 1997 report included data from 13 females and two males, but only six females were used to draw the conclusions and set recommendations regarding female habitat selection in relationship to all three road parameters on NFS lands in the U.S. (i.e., OMRD, TMRD and core area)[14]. The six females were captured in non-wilderness portions of multiple use areas and represented approximately 15 percent of the then estimated minimum population of 40 grizzly bears for both ecosystems (Selkirks=25; Cabinet-Yaak=15 per USDI Fish and Wildlife Service 1993). The average age[15] of the study bears was 11.5 years old during the 1989-1994 study period (Attachments A and B).

All four of the Selkirk ecosystem females were adults during the data collection period (1989-1991), but one of the two Yaak female grizzlies was an independent subadult (bear 206)[16] for the first two years of the data collection period used for that ecosystem (1991-1994). This female was noted for her tolerance of higher open and total road densities (51.5 and 38.2 percent, respectively) and lower than average use of core area (40 percent) which was due, in part, to her use of more heavily roaded areas north of the Cabinet-Yaak recovery zone in British Columbia. Concerns have been raised regarding the incorporation of home range data from this subadult female during the time period prior to reaching reproductive age (i.e., 1991-1992); specifically, that her home range would change once she reached maturity[17]. However, additional monitoring of her movements once she reached maturity, bred, and successfully produced

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[13] Idaho Fish and Game and British Columbian personnel trapped 16 females and 18 males (total=34) between 1983 and 1994 in the Selkirk Recovery Zone (17 in US: 17 in BC) while U.S. Fish and Wildlife Service and Montana Fish Wildlife and Parks personnel trapped 7 females and 9 males (total=16) in the Cabinet Mountain and Yaak River portions of Cabinet-Yaak Recovery Zone (13 in Yaak; 3 in Cabinets) for the same time period (Kasworm et al. 2007, Wakkinen and Johnson 2000). The 13 female bears used in the Wakkinen and Kasworm (1997) study represented 94 percent of all available adult female radio-collared bears (total=16) between 1989 and 1994. The remaining 3 bears were not used in the study due to a limited number of radio-locations or lack of evidence of reproduction.

[14] All six bears spent the majority of their time in the United States portion of the two ecosystems where better road information for open and barriered roads was available. The authors did analyze TMRD for 9 bears that resided in British Columbia (Wakkinen and Kasworm 1997).

[15] Average age was determined by computing the annual average age of study bears for each year of the study and then calculating an overall average based on these numbers for the entire study period.

[16] Three years (1991-1993) of radio telemetry data was collected from bear 206 who was two years old when first captured in 1990. Her 1991-1992 radio locations reflected her habitat use as an independent subadult bear (i.e., ≤ 5 years old). However, she was observed consorting with a nine year old male in 1992 although she did not emerge from the den in 1993 with any cubs. She was considered an adult in 1993 and lost her collar in the den before emerging in 1994. A cub of bear 206 was captured in 1994 and was monitored with her mother and sibling until late May of 1995. Bear 206 was observed in 1997 with 2 cubs and was identified by the presence of ear tags.

[17] Female cubs generally establish their home range within or overlapping with their mother's home range (Aune and Kasworm (1989) and McLellan (1989).

cubs (1993-1994) demonstrated her continued use of the same general home range quantified as a subadult (Kasworm et al. 2009).

The Mace and Manley (1993) research captured and collared 38 individual grizzly bears from 1987-1992, but only nine adult female grizzly bears were used in this preliminary analysis of habitat selection in relationship to roads[18]. These nine females represented approximately three percent of the estimated 306 bears in the ecosystem (USDI Fish and Wildlife Service 1993, Mace and Manley 1993). Grizzly bears were captured within non-wilderness multiple use lands with radio relocations completed once a week from 1987-1989 versus twice a week from 1990-1991 on this set of female grizzlies. The average age of the study bears was 13.1 years old during the 1987-1992 study period (Attachments A and B).

The subsequent re-analysis of the Mace and Manley data for development of motorized access standards for the Flathead National Forest (i.e., Amendment 19) incorporated the OMRD, TMRD, and core area parameters per IGBC (1994) direction. However, only seven of the original nine females were selected for this new analysis (USDI Fish and Wildlife Service 1995). These seven females represented approximately two percent of the minimum estimated population of 306 bears in the ecosystem (USDI Fish and Wildlife Service 1993) (Mace and Manley 1993). The use of only seven of the original nine study animals likely explains some of the differences observed between the Mace and Manley (1993) results and the Amendment 19 numbers summarized above. The average age of the study bears was 12.5 years old during the 1987-1992 study period (Attachments A and B).

The South Fork Flathead research project resulted in the capture of 50 grizzly bears[19] over the 10-year study period (1987-1996) (Mace and Waller 1997). The Mace et al. (1996) journal publication re-examined aspects of grizzly bear habitat selection in the study area using a more robust sample of 13 female grizzlies and their weekly movements from a slightly different time period (1990-1994), with all radio collared bear locations consistently collected twice a week. Six of these study animals were adults for the duration of the study, while another two were 4.5 years old in 1990, and the remaining five were subadults for some portion of the 1990-1994 study period[20]. The average age of the study bears was 10.9 years old during the 1990-1994 study period.

One review of the Flathead Amendment 19 information suggested that conclusions drawn from the small study sample was not likely representative of all bears in the population (McLellan et al. 2000). Specifically, *"although adult females are the most critical segment of the population for population growth, they can't meet conservation requirements alone. Subadult females are needed to replace adults and adult males are also needed…"*(McLellan et al. 2000). This argument supports the inclusion of subadult females in the study sample in the Wakkinen and Kasworm (1997) report and Mace et al. (1996) journal publication.

To summarize, both the South Fork Flathead River (and its application to the Flathead Amendment 19) and SCYE studies used a relatively small number of study animals to draw their conclusions regarding female grizzly habitat selection in relationship to roads within multiple-use lands. More study bears would increase the reliability of the data for the Selkirk and Cabinet-Yaak Recovery Zones. However, grizzly bears are a species that occur at low densities, so it is difficult to obtain large numbers of study

[18] Mace and Manley (1993) successfully trapped 23 females and 16 males (total=39) but only collared 38. Their report also included habitat use in relation to roads for adult and subadult males as well as subadult females, but it not clear from the document how many individuals were included in those samplings.
[19] Montana Fish, Wildlife and Parks personnel successfully trapped 29 females and 21 males during the 10-year study. The 38 grizzly bears mentioned in footnote 18 were a subset of these 50 bears.
[20] Seven bears were included in the 1990-1994 study effort that were subadults when first collared. In no single year did subadults outnumber the adults in the study sample. This resulted in a ratio of adults:subadults of 7:3 in 1990, 8:2 in 1991, 10:1 in 1992, 9:1 in 1993, and 8:1 in 1994.

animals for a given study area and time period. Both the South Fork Flathead and Selkirk-Cabinet-Yaak researchers engaged in significant efforts to sample their respective study areas in order to have as large and representative sample as possible. The sample of female bears (n=6) used in the Selkirk and Cabinet-Yaak study represents a larger proportion of the number of resident female bears available in the two ecosystems at the time of the study based on the population estimates and is comparable with the number of bears used in the South Fork Flathead River study (n=9 and 13), and Flathead Amendment 19 analysis (n=7).

In addition, the inclusion of two years of data from a subadult female in the Wakkinen and Kasworm (1997) study does not change the conclusions from their report. Additional monitoring of her movements once she reached maturity, bred, and successfully produced cubs demonstrated her continued use of the same general home range quantified as a subadult.

Reproduction and Mortality of Study Bears

Successful rearing of offspring that in turn successfully produce their own offspring is one indication that the habitat is capable of producing survivors that contribute to a population increase. All of the adult bears in the two studies were chosen because they had survived long enough to provide sufficient data for analysis and had reproduced within the study area[21]. The six females used in the Wakkinen and Kasworm (1997) study produced from 2-13 cubs/each from 1985 to 1997 (ibid, Kasworm et al. 2009) (Attachment A). Likewise, ten of the South Fork female study bears produced 1-5 cubs/each from 1986 to 1996 (Mace and Manley 1993, Mace and Waller 1997)(Attachment A).

Both the Mace and Manley (1993) and Wakkinen and Kasworm (1997) research efforts indicate that at least one female offspring from the respective study areas subsequently produced offspring that reached dispersal age (2 or 3 years of age)[22]. In the Wakkinen and Kasworm study, all four Selkirk females produced cubs and three of these females are known to have produced eight cubs that survived to dispersal age (≥2.5 years of age)[23] (Attachment A). In addition, multiple offspring have been identified as progeny from the Yaak study area adult female 106 (i.e., female offspring 206, 303, 353, and 354)

[21] All female study bears produced young either during or prior to the study's monitoring period. In their Biological Opinion for the Flathead NF Amendment #19, the USFWS believed the motorized access conditions within the composite home range represented a valid approach to habitat management due, in part, because telemetry data from adult females that had demonstrated survival to adulthood were used in its construction (USDI Fish and Wildlife Service 1995).

[22] There is a paucity of data on radio-collared cubs for a number of reasons (Wakkinen and Allen pers. comm. 2011a): Collaring methods are geared towards avoiding capture of cubs to reduce potential safety issues for the trapping crew and the cubs, and there are issues associated with placing radio collars on cubs even if they were captured. Survival rates of cubs are based on observing radio-collared females and monitoring the presence/absence of their offspring. This is a conservative method to calculate survival rates as the cub *must* be observed with the female or they are presumed dead. Given this and the survival rates that have been calculated for all age classes in the Selkirk and Cabinet-Yaak, it is reasonable to expect adult female bears to successfully provide female offspring that are recruited into the adult segment of the population. The sex ratio of cubs of known sex does not differ from an expected 50:50 in grizzly bears (ibid). Therefore, the number of female cubs likely produced from the six females would be estimated at 16 of the 33 cubs produced during this time period.

[23] At least fifteen cubs were produced by the four Selkirk females, 1985-1991. Of these, two were known to be females and three were males. One of the female cubs was killed at age one and the other cub was killed at age three. The males reached dispersal age and dropped their collars so their long term fate is unknown. The fate of the remaining 10 cubs is also unknown (Wakkinen and Allen pers. comm. 2011b). Based on the information provided in footnote 22, at least 5 of these cubs were likely females.

(Kasworm et al. 2009)[24]. One of these, female 206, was also part of the 1997 study. All four of these female offspring reached maturity and are known to have produced cubs between 1994 and 2007 (ibid).

In the Mace and Manley (1993) report, study females 1, 48, and 96 produced female offspring that reached maturity, with five of these offspring subsequently incorporated into the 1990-1994 Mace et al. (1996) research effort (Mace and Manley 1993, Mace et al. 1996, Mace and Waller 1997)(Attachment A). One of these offspring, bear 147[25], in turn produced a female cub that survived to dispersal. However, this cub and her male sibling become habituated to humans and were killed as a management action after separating from their mother in 1992. Her mother (147) was subsequently killed in a management action in 1993 after also becoming habituated to humans. In addition, a female cub produced by study female 96 (i.e., #18) reached maturity and produced a cub (of unknown sex) that was still with its mother at the end of the study in 1994. All seven females used for the Flathead amendment produced cubs with at least two of these being female offspring that reached maturity (ibid) (Attachment A).

Given the relatively high rates of grizzly bear mortality, it is not surprising that a few of the female study animals might die during the research period. However, concerns have been expressed that inclusion of study animals that die due to human causes may introduce a bias into the study results. More specifically, the assumption is that habitat conditions used by these particular study bears somehow proved "lethal" to them and consequently their selection data should not be used to develop motorized access standards in the SCYE. The 1993 Mace and Manley progress report (time period 1987-1992) included data from three female grizzly bears that died during the study period (out of the nine total females used in the road analysis). These deaths were attributed to human[26] and natural[27] causes (Mace and Manley 1993). The subsequent South Fork Flathead River research paper included a larger sample size of female grizzly bears (13) and a different time period (1990-1994), but noted that one of the female grizzlies was killed within the study area in a management removal in 1993 and another was killed in 1994 (Mace et al. 1996, Mace and Waller 1997) (Attachments A and B).

Conversely, none of the six grizzlies used in the Wakkinen and Kasworm study died during the period of data collection (Selkirks 1989-1991; Yaak 1991-1994) although two of these females were killed by humans in the Selkirk Mountains after the data collection period. These included the following:

- In 1992, a 12-year old female (1015) was shot and killed by a hunter in secure (i.e., non-roaded) habitat in British Columbia within the original study area. Her death was deemed a "self-defense" killing by the authorities.
- In 1993, a second female (867)[28] was killed by a hunter, but this mortality was classified as a malicious killing. In this case, the hunter walked more than two miles behind a closed gate before encountering this 15-year old female and her two young-of-the-year cubs (Wakkinen and Kasworm 1997; Allen and Carr pers. comm. 2009). The site of her death was within 500 meters of an approximately 20-square mile block of roadless area situated in the Kalispell-Granite[29],

[24] The ability to track the reproductive success of the four Selkirk female grizzly bears using DNA profiling was eliminated when all frozen blood samples were lost due to a power outage at the Boise-based storage facility (Allen and Wakkinen pers. comm. 2011).
[25] Offspring of South Fork Flathead River study bear 1 (Attachment A).
[26] Female bear 1 was killed in May of 1988 in a mistaken identification shooting. She left behind a pair of two year old cubs that were incorporated into the study in 1990 (Mace et al. 1996; Mace and Waller 1997).
[27] Female bear 97 was found dead about three months after her initial collaring in 1988. She may have been killed by a male grizzly bear that was also part of the study. Female bear 143 was found dead with her cubs in an avalanche chute in 1991.
[28] This female was the first grizzly to be radio collared in the Selkirks (1983) and produced eight cubs prior to her death in 1993.
[29] Officially added in 1993 along with the Lakeshore BMU based on the use of the area by this same bear (867) in during the spring time in the 1980s and early 1990s (USDI Fish and Wildlife Service (1993).

LeClerc, and Salmo-Priest BMUs, but more than five miles outside of the 1997 study area boundary.

In both instances, the fact that the areas were open to legal big game hunting (as dictated by state and provincial fish and game agencies) led to the events surrounding the death of these grizzly bears after a hunter chose to walk into secure core habitat or an area that was restricted to motorized travel where they subsequently encountered and killed the study bear. Both mortalities would likely have been prevented if these areas had been closed to big game hunting[30]. These post study mortalities do not change the levels of habitat conditions selected by grizzly bears in either ecosystem. It is not appropriate to conclude from these mortalities that selecting more secure habitat would have prevented these mortalities (as shown by the fact that some grizzly bear mortality occurs in core areas are greater than 500 meters from a road in both study areas) or that the habitat conditions proved "lethal" to bears. As suggested by McClellan et al. (2000), a more appropriate analysis to answer this question would be to complete an assessment of home range and habitat use for “successful” and “unsuccessful” bears to see if use patterns were similar or not[31].

Mace and Waller (1998) found annual mortality rates for grizzly bears using rural areas and the wilderness zone were 21 and 15 times higher, respectively, than for bears using only multiple-use lands[32], which demonstrates that bear mortality is a function of numerous variables besides the amount and juxtaposition of motorized access alone. Some of these variables include the type and seasonality of hunting seasons, the availability of lethal attractants (i.e., human provided--e.g., garbage, agricultural products such as orchards/grain/livestock, or big game carcasses), and the amount and juxtaposition of private property and associated development. In the Greater Yellowstone Ecosystem, Schwartz et al. (2010) found that survival of grizzly bears was best explained by the amount of human development and ungulate hunting that occurred within the home ranges of bears. Mortality data for the SCYE from 1982-2010 demonstrates the complexity of this relationship between observed human-caused bear mortality and roads, sanitation, hunting, and land ownership (IGBC SCYE 2010, Kasworm et al. 2009, Wakkinen et al. 2010). Grizzly bear mortalities occurring on NFS lands have typically been associated with the spring black bear or fall big game/black bear hunting seasons.

In conclusion, both the South Fork Flathead River and SCYE grizzly bear studies used females that successfully raised young to dispersal age and maturity and documented the death of some of the study animals either during or after the study period was over. In both research efforts, there is evidence that some female study bears produced female cubs that subsequently raised cubs to dispersal age. The incorporation of female grizzlies that successfully produce young is an indication that their use patterns would result in the production of future generations of grizzlies to support an overall population

[30] There have been eight additional documented cases in the SCYE where grizzly bears were shot and killed in “secure” (>0.31 miles from an open road) habitat on NFS lands from 1982-2010 (U.S. only). In all cases, bears died because individuals were traversing public lands with a firearm during the hunting season and did one of three things: (1) shot the grizzly after mistakenly identifying it as a black bear which was legal to shoot; (2) shot the bear intentionally (i.e., poaching); or (3) shot in self-defense when threatened by the grizzly bear.

[31] McClellan et al. 2000 provided a peer review of the South Fork Flathead River research and made the following observation: “If the 'successful' females had home range and areas of use different from ‘unsuccessful’ females, then the characteristics of the successful females’ ranges may be considered sufficient as the basis for conservation planning. However, if the home ranges and habitat use patterns were similar, but some were just luckier or more skilled at avoiding people within their range, then the ‘lucky to be successful’ females may not be suitable as the basis for conservation planning. If the successful females lived in more secure areas than unsuccessful females, then it would be assumed they needed that level of security to be successful: perhaps they could have done fine with less security. Without comparing the range locations and habitat use of bears with varying levels of ‘success’ then the question of whether bears from the Swan Valley study can form the basis of a conservation strategy “ remains unanswered.

[32] Composite female home range was 56 percent roadless (0 km/km^2) in these multiple use lands (Mace et al. 1996).

increase. Likewise, some of the study bears were killed during (South Fork of the Flathead) or just after (SCYE) the study period was over. This post study mortality information does not change the levels of habitat conditions selected by grizzly bears in either ecosystem, as the selection of more secure habitat would not have prevented these mortalities due to the presence—and popularity—of legal hunting of black bears and other big game throughout the recovery zones and surrounding areas.

Resource Selection Analysis

Analysis of grizzly bear use of the available habitat in relationship to road densities was analyzed in both studies using the use/availability technique developed by Neu et al. (1974). Statistical tests of comparison were conducted at two resource selection levels in the South Fork study but only one level of resource selection for the Selkirk and Cabinet-Yaak study. Johnson (1980) defined levels of resource selection as follows:

- Resource selection occurs in a hierarchical fashion from the geographic range of a species (first order), to individual home range[33] within a geographical range (second order), to use of general features (habitats) within the home range (third order), to the selection of particular elements (food items) within the general features (or feeding sites).

Many factors influence resource selection, including population density, intraspecific and interspecific competition, predation, and habitat availability (size, juxtaposition) among others (Peek 1986).

One of the limitations of the Wakkinen and Kasworm (1997) effort was that they did not complete a second-order resource selection analysis in regards to motorized routes within observed home ranges. Such an analysis would help explain if these bears had the opportunity to select greater levels of unroaded habitat elsewhere in the recovery zone or if their results were merely a reflection of what was available to the study bears at that time (USDI Fish and Wildlife Service 2001). The authors did not complete this analysis because an access route map for the entire ecosystem was not available for the study period for analysis in a GIS. However, an overall GIS road layer is now available for development of a map reflecting a conservative approximation of the amount of core habitat the study bears experienced before and during the tenure of the research effort. Therefore, we reviewed the home ranges of the six SCYE grizzly bears in relationship to the maximum possible amount of core habitat available in the two ecosystems[34] .

Figures 1 and 2 illustrate that the SCYE study bears did indeed have several large areas of core habitat available to them within the recovery zone boundaries in the U.S. during the tenure of the research effort (1989-1994)[35]. These maps reflect the maximum roaded conditions that the study bears experienced as they dispersed from their mothers, matured, and/or reproduced from 1985 to 1994. In the SE, this included a large block (> 40 square miles) in the Salmo-Priest and Sullivan-Hughes BMUs (#1

[33] Home range is defined as the area where an animal lives and travels in (Burt 1943). It is generally supposed that animals establish home ranges because it is more efficient to utilize familiar rather than unfamiliar areas (McLellan 1985).

[34] Road layer used for this analysis reflects a very conservative portrayal of conditions that existed around the time the respective Forest Plans that incorporated the two grizzly bear ecosystems were completed (i.e.1986-1987) (see Attachment C for details on rationale). Our approach was conservative in order to show the minimum amount of habitat that could potentially function as core habitat during this time period in order to answer the question as to whether grizzly bears had other habitat available to them that had no motorized routes. In addition, these numbers do not reflect the roaded and core habitat available with the SE and CYE home ranges that occurred in British Columbia. As a result of this, our portrayal of core habitat is not directly comparable to the amount of core documented in the grizzly bear home ranges from Wakkinen and Kasworm (1997) as our approach **underestimates** the amount of core that was available to the research bears during the actual tenure of the study.

[35] **Note:** Grizzly bear home ranges were provided for these figures as a courtesy by Idaho Department of Fish and Game and USDI Fish and Wildlife Service and are not on file with the USDA Forest Service.

on the map), a large block in the Long-Smith and Trout-Ball BMUs that was used on a limited basis by study bear 1084 (#2), the Selkirk-Crest in Myrtle and State Land BMUs which includes portions of the 1967 Sundance Burn (and associated huckleberry fields) (#3), and a smaller block of lower elevation unroaded habitat in the Sullivan-Hughes BMU (#4). All four bears in the SE had access to this array of habitats within close (1-5 miles) proximity of their existing home ranges and conceivably could have altered their selection of home range to incorporate more core habitat.

Likewise, the Cabinet-Yaak Ecosystem had numerous BMUs with large blocks of unroaded habitat available within the Cabinet Mountain portion of recovery zone (e.g., Cedar, Snowshoe, Boulder, Callahan, Scotchman and Spar, Bull, Saint Paul, Wanless and Silver Butte-Fisher)[36]. Within the immediate vicinity of the Cabinet-Yaak Ecosystem study bears in the Yaak, there was additional areas of contiguous and adjacent unroaded habitat whose use would have resulted in higher levels of unroaded use than those observed from 1990-1994. This observation was originally made by one of the researchers in responding to an unpublished report that criticized the results of the Wakkinen and Kasworm (1997) study effort (Kasworm et al. pers. comm. 2003).

[36] The question of viable travel corridors has been mentioned in regards to the ability of bears to cross large rivers (i.e., Kootenai) or highways (i.e., Highway 2) in order to travel between the Yaak and Cabinet portions of this ecosystem. While these features undoubtedly have an impact on bear movement, grizzly bears have been documented swimming large rivers and crossing major highways in this and the Selkirk ecosystem (Waller and Servheen 2005, Allen 2011, IGBC SCYE Subcommittee 2011, Kasworm et al. 2009, Wakkinen et al. 2010).

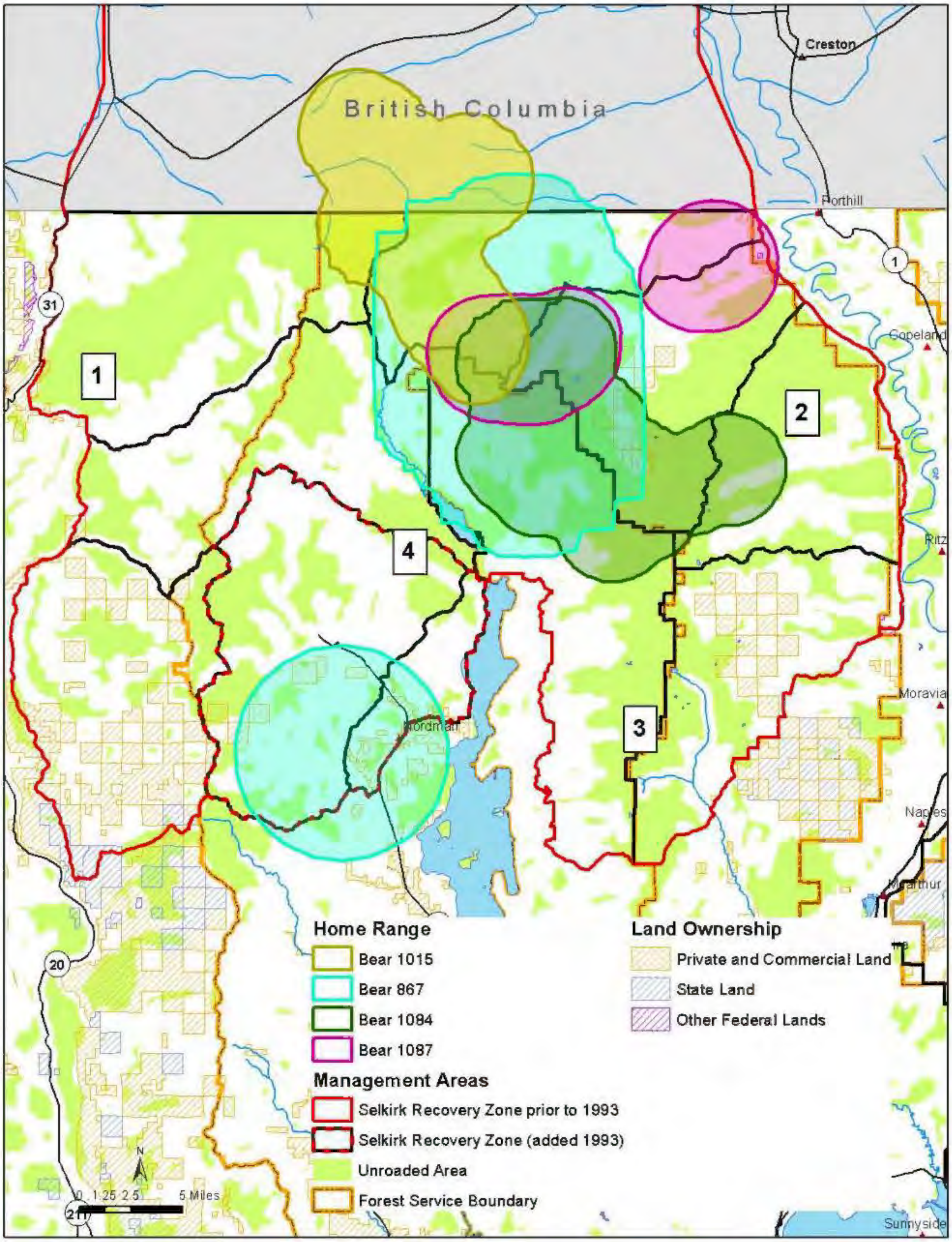

Figure 1. Grizzly bear home ranges for four (4) females (1989-1991) in relation to unroaded areas (~1987) within the U.S. portion of the Selkirk Recovery Zone. Home range data from Wakkinen and Kasworm (1997).

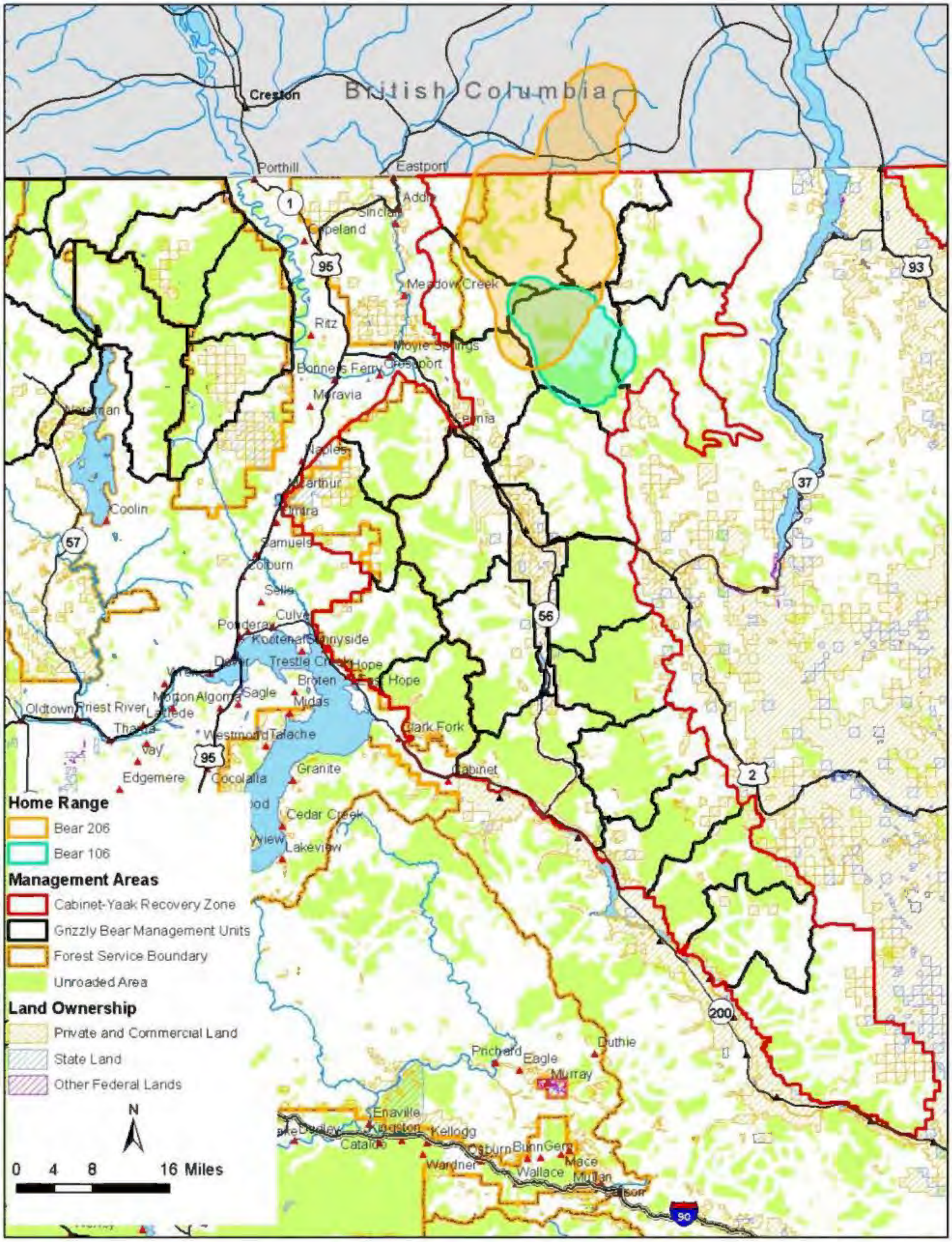

Figure 2. Grizzly bear home ranges for two (2) females (1989-1991) in relation to unroaded areas (~1987) within the U.S. portion of the Cabinet-Yaak Recovery Zone. Home range data from Wakkinen and Kasworm (1997)

More specifically, the composite home ranges of the Selkirk and Cabinet-Yaak study bears in the U.S. reflected 41.8 and 28.8 percent core habitat, respectively, versus 45.1 and 39.6 percent core habitat available throughout the remaining portions of the respective recovery zones (in the U.S.)[37] (Table 1). These results indicate that bears were selecting habitats with the same—if not more—roads than found within the entire ecosystem.

Table 1. Summary of available core area versus roaded habitat within the Wakkinen and Kasworm (1997) study home ranges versus the grizzly bear ecosystem. See footnote 36 and Attachment C of this document for details on the development and use of these data.

Area	Grizzly Bear Recovery Zone							
	Selkirk				Cabinet-Yaak			
	Total Area (U.S./B.C.)	U.S. only	U.S. Roaded	U.S. Core	Total Area (U.S./B.C.)	U.S. only	U.S. Roaded	U.S. Core
	square miles				square miles			
Bear Home Range	421.1	358.4[1]	216.4[2]	141.9[3]	407.9	312.8	222.9	89.8
Recovery Zone	2,043.5	1,076.2	610.2	465.9	*U.S. only→*	2,645.7	1,663.6	982.1

[1]Includes 27.1 square miles of home range area located outside of the 1993 Recovery Zone boundary (see Figure 1).
[2]Includes 20.9 square miles of roaded area outside the 1993 Recovery Zone boundary (see Figure 1).
[3]Includes 6.2 square miles of core area outside the 1993 Recovery Zone boundary (see Figure 1).

Our re-examination of roads in grizzly bear home ranges and the recovery zones (in the U.S.) demonstrates that the core area results from the Wakkinen and Kasworm (1997) research effort are a reflection of bears actively choosing these areas and not an indication that they had a lack of opportunity to select home ranges with fewer roads. This evaluation supports our use of the Wakkinen and Kasworm (1997) study results in developing access parameters for grizzly bears in these two ecosystems.

Conversely, in the South Fork study, one of the authors' objectives was to examine the relationship between grizzly bear habitat selections in regards to road densities on multiple-use lands. To this end, they completed what they considered to be a second-order resource selection analysis comparing road densities within female grizzly bear home ranges to a larger study area dominated by multiple-use management[38] (Mace and Manley 1993 and Mace et al. 1996). The composite home range of their 13 female grizzly bears was characterized by a lower road density of 1.02 mi/mi^2 (0.6 km/km^2) with 56 percent of the area unroaded versus the rest of the study area where road densities were 1.86 mi/mi^2 (1.1 km/km^2) and 30 percent was unroaded (ibid). However, their analysis was not a 'true' second-order resource selection analysis because their study area only represented six percent of the entire Northern Continental Divide Recovery Zone (i.e., home range within an entire geographical range=second order selection analysis) (Johnson 1980). However, since their objective was to examine use in relation to roads on multiple use lands this analysis was useful in determining the cutoff in open and total motorized road densities tolerated by grizzly bears using these kinds of areas within the recovery area. In addition, the South Fork researchers completed a third-order resource selection analysis when they examined grizzly bear use within a female multi-annual (1987-1992) composite home range in relation to total road

[37] Only the Selkirk recovery zone extends into British Columbia (B.C.). This assessment does not include areas within B.C.
[38] These areas were located on the Flathead National Forest and primarily included roaded areas where activities such as resource extraction and public recreation occur. Larger wilderness areas (e.g. Bob Marshall) and National Park lands (e.g. Glacier) were excluded from consideration. Inclusion of large tracks of unroaded habitat would have undoubtedly altered the statistical conclusions of the South Fork study data. However, given that the results were used to develop recommendations for road densities and secure habitat for application within these same multiple-use lands, their analysis was useful in answering this question—but does not represent a second-order analysis as defined by Johnson (1980).

density (Mace and Manley 1993). A subsequent characterization of grizzly bear habitat using seven of the female grizzly bears from this study was used to set OMRD: TRMD: core standards for the Flathead NF (i.e., Flathead Amendment 19). The researchers did not re-assess their Mace and Manley (1993) analysis for core area, ORMD, and TMRD in their 1996 publication with a larger sample size of female grizzly bears (Mace et al. 1996).

To summarize, both the NCDE South Fork and SCYE studies were completed in multiple-use areas that were typified by varying levels of road densities and significant levels of resource management including timber harvest and recreation. The SCYE researchers did not complete a second-order selection analysis examining home range selection versus the respective recovery zone boundaries. However, our review of the home ranges in relationship to available core areas in both ecosystems indicates that bears had opportunities to select large blocks of unroaded habitat that included an array of vegetation types, elevations, slopes, and aspects throughout the respective recovery zones. Our review indicates that the road density and core area results from the Wakkinen and Kasworm (1997) research are a reflection of bears actively choosing these areas and not an indication that they had a lack of opportunity to select their home ranges with fewer roads. This is true both in terms of visual inspection and percentage of core area acres available outside home ranges but within the recovery zone boundaries. The South Fork researchers conducted a partial second-order resource selection analysis in that it was truncated to only include consideration of multiple-use dominated lands rather than the entire recovery zone. Both research efforts completed a third-order resource analysis to determine grizzly bear tolerances to open and total road densities.

Home Range Analysis

Another difference between the two studies involves the use of female home ranges in examining habitat use in relationship to the three access parameters. In both studies, researchers used the computer program CALHOME (Kie et al. 1996) and an adaptive kernel home range estimator (Worton 1987) with a 95 percent isopleth in calculating bears home ranges. However, the South Fork Flathead River researchers used a *composite* multi-annual (i.e., combination of multiple females) home range to examine this question in their 1993 progress report and 1996 publication (Mace and Manley 1993, Mace et al. 1996) while the Selkirk and Cabinet-Yaak effort was completed using an average of *individual* multi-annual home ranges (Wakkinen and Kasworm 1997).

In the case of the South Fork research, the study area and overlapping nature of the bear home ranges lent itself to characterizing overall female habitat use in relation to roads using one unified home range (Mace and Manley 1993; Mace et al. 1996). However, in their subsequent third-order seasonal habitat selection investigation for the South Fork study Mace et al. 1996 did not use composite home ranges from multiple bears because the authors recognized that *"pooling of individuals is not appropriate because resource availability and selection is unique to the individual bears"*. Conversely, authors of the Selkirk/Cabinet-Yaak report were working with bears from two different disjunct recovery zones and it was not possible to combine habitat use into one unified home range. That being said, their use-availability analysis did provide OMRD: TRMD: core area data for the cumulative (or composite) home range within both recovery zones, and these levels are equal to or are worse (i.e., would protect less habitat) than the averages that characterize individual bear home ranges[39] (Table 2).

[39] Based on "available" habitat derived from individual home ranges that were layered on top of one another resulting in a cumulative area that was considered to be available to the bears in the recovery zone (Wakkinen and Kasworm 1997, pg 11). This is equivalent to the approach used in developing a composite home range for the South Fork Flathead River study (Mace and Waller 1997, pg 47 and 66). Available habitat for OMRD:TMRD:Core areas within the composite home range was derived

Table 2. Summary of composite, individual bear, and associated averages for motorized access parameters by recovery zone, 1989-1994 (from Tables in Wakkinen and Kasworm 1997).

Recovery Zone	Study Area	Home Range Category	Motorized Access Parameters		
			Percent OMRD > 1 mi/mi^2	Percent TMRD > 2 mi/mi^2	Percent Core Area
Selkirk	South (US)	Composite[1]	34.5	26.4	54.6
		Bear 867	28.1	25.1	55.3
		Bear 1015	34.9	27.3	53.4
		Bear 1984	16.7	14.3	71.5
		Bear 1087	35.4	23.8	53.7
		Average for Bears	28.8	22.6	58.5
Cabinet-Yaak	Yaak	Composite[1]	47.3	35.1	44.1
		Bear 106	34.5	27.7	53.3
		Bear 206	51.5	38.2	40.0
		Average for Bears	43.0	33.0	46.7
Average for all Bears in Both Recovery Zones			33.5	26.0	54.5

[1]Based on "available" habitat derived from individual home ranges that were layered on top of one another resulting in a cumulative area that was considered available to the bears in the recovery zone (Wakkinen and Kasworm 1997). This is equivalent to the approach used in developing a composite home range for the South Fork Flathead River study (Mace and Waller 1997).

IGBC direction was to develop these access parameters "utilizing the largest *individual* annual home ranges of adult females" (IGBC 1994). Wakkinen and Kasworm (1997) followed this guidance when analyzing their bear data. In addition, an independent peer-review of the Amendment 19 analysis on the use of a composite multi-annual home range notes "*that it may be misleading to describe a core area by defining a composite home range using all telemetry locations for all female bears. If some female bears have more locations than others then the composite home range will be biased towards those females and could, in turn, affect the results of core size and the amount of roads an "average" bear will tolerate. A median core size and median amount of roads tolerant to bears may be a better metric*" (McClellan et al. 2000). In the case of the SCYE, a median OMRD: TMRD: core area value for the six bears would be 35:26:54 percent.

Two significant differences that likely influenced the resulting home range and observed OMRD, TRMD, and core area include the following:

- From a biological perspective it is worth noting that adult female home ranges from the South Fork Flathead River study were, on average, **2.5 times smaller** than the home ranges defined by the six adult females in the Selkirk/Cabinet-Yaak study (Mace and Waller 1997, Wakkinen and Kasworm 1997)[40]. This suggests a significant difference in the availability and juxtaposition of preferred seasonal habitats between the two ecosystems (Blanchard and Knight 1991; McLoughlin et al. 1999). Additionally, bear populations between the two studies are very different, with notably higher densities of bears residing in the North Continental Divide Ecosystem and South Fork Flathead study area (Mace and Manley 1993; Mace and Waller 1997) than in either the Selkirk or Cabinet-Yaak Ecosystems (USDI Fish and Wildlife Service 1993).

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from Tables 10, 8, and 12 of Wakkinen and Kasworm (1997). Within home range availability for individual grizzly bears is from Tables 11, 9 and 13 of Wakkinen and Kasworm (1997).

[40] **South Fork Flathead River:** 10 females; average = 48 square miles with a range in size of 18 – 105 square miles.
Selkirk/Cabinet-Yaak: 6 females; average = 120 square miles with a range in size of 83 – 335 square miles.
The Flathead NF BMUs (subunits) are correspondingly much smaller than those developed for the SCYE (USDA ForestService 2007).

Social factors such as kinship, density, and population structure may significantly affect the resulting size of individual bear home ranges (Nagy and Haroldson 1990).

- Another important point regarding the development of the standards relates to the juxtaposition and availability of habitat by land ownership and the presence of Federal, state, or county highways within the composite home ranges of the study bears. The Wakkinen and Kasworm study bears were selecting habitats managed by multiple entities besides the Forest Service including the state of Idaho, private industrial forest companies, private land owners, and British Columbia provincial forestry lands where there were virtually no restrictions on motorized route development or associated vegetation management. Conversely, the study bears in the South Fork Flathead River study selected habitats located exclusively on NFS lands[41].

These differences help illustrate why application of standards developed in one area should not be applied to other populations without consideration of local conditions and variation in population parameters, habitat availability, and habitat selection. The IGBC took this into consideration when it advised recovery zone subcommittees to develop access standards based on local grizzly bear data (IGBC 1994).

To summarize, both research efforts used the same home range software and estimator when generating their female grizzly bear home ranges. However, the South Fork researchers chose to use a composite home range while Wakkinen and Kasworm (1997) opted to use the average of individual female home ranges, which is in line with IBGC direction. This approach provides a range of habitat selection data for review and development of management standards based on what an "average" bear will tolerate in regards to road density and available core area (range of variation). In the case of the SCYE study, both average and median values for individual access parameters (i.e., OMRD:TRMD:core area) from the Wakkinen and Kasworm (1997) study are within one to two percentage points of one another.

Core Block Size

Core block size has been identified as a possible concern for habitat conditions in the Selkirk and Cabinet-Yaak Ecosystems. Neither Wakkinen and Kasworm (1997) nor the various research conducted in the South Fork Flathead River area of the North Continental Divide Ecosystem (Mace and Manley 1993, Mace et al. 1996, Mace and Waller 1997 and 1998) established a minimum effective core block size. The Flathead NF Amendment 19 uses a minimum core area size of 2,500 acres (3.9 square miles). The Biological Opinion for the Flathead Amendment 19 (USDI Fish and Wildlife Service 1995) noted that 83

[41] Application of the standards within individual BMUs differs among the three recovery zones. When applying the Amendment 19 standards, the Flathead NF does not include small private lands or large (>320 acres) lakes in core habitat calculations; and does not include small private lands, MS3 habitat, or large lakes in road density calculations: these acres are excluded from the acreage/percentage calculation after the buffering or moving window process was completed (Ake and Allen pers. comm. 2011, USDA Forest Service 1994a and 199b, USDI Fish and Wildlife Service 1995). This effectively eliminates motorized routes that occur off NFS lands. Conversely, forests in the SCYE include all roads on NFS and other lands as well as all lands regardless of ownership. While this difference in the application of standards would likely be inconsequential for BMUs where the majority of land ownership is managed by the National Forest (e.g., CYE—Cedar BMU; SE—Sullivan-Hughes BMU), it would create a more substantial disparity in BMUs with considerable small private parcels or highways/developments within or adjacent to their boundaries (e.g. CYE—Boulder BMU; SE—Lakeshore BMU). This may affect considerable variation in the on-the-ground results between the NCDE and the SCYE. For example, using the 2009 road condition as source data, analysis of Boulder BMU under the Flathead Amendment 19 protocol in ARC/Info would result in a 5 percent TMRD **decrease** (35 to 30 percent) compared to the methods currently employed in the SCYE. For this reason alone, it would be inappropriate to average the Flathead National Forest road density standards and standards derived from Wakkinen and Kasworm (1997).

percent of some adult female grizzly bear use was in unroaded blocks greater than 2,260 acres in size in the preliminary Mace and Manley study, but no sample sizes were disclosed nor was any statistical analysis completed in the 1993 report or subsequent report or journal article to substantiate this (or the 2,500 acre) number (Mace and Manley 1993, Manley et al. 1996, Manley and Waller 1997). McLellan et al. (2000) observed that the 2,500-acre figure was based on a personal communication from researcher Tim Manley[42]. Wakkinen and Kasworm (1997) demonstrate that smaller-sized core blocks tended to be underutilized by their study animals – particularly those of less than two square miles (1,280 acres). However, while more than 97 percent of the use by successfully reproducing females in the SCYE occurred in blocks greater than two square miles, actual use occurred in blocks as small as 0.22 square miles (141 acres). Although both study areas produced similar trends, use statistically exceeded availability of habitat in that category in only one instance (block sizes of 8-10 square miles by Cabinet-Yaak Ecosystem females), and this pattern of significance was not repeated by this same group in the greater than 10 square mile size class. The researchers were unable to determine a minimum core size with the data set available, but suggested that **if** it occurred, it was likely between two square miles and eight square miles[43].

Within the Cabinet-Yaak Ecosystem, more than 95 percent of core habitat is in blocks greater than four square miles in size based on 2009 reporting data (Table 3). The amount of core in smaller blocks ranges from less than 5 percent of the KNF and IPNF portions of the Cabinet-Yaak Ecosystem, to about 7 percent of the LNF portion[44]. See Figure 3 for spatial distribution of core habitats by block size category in the Cabinet-Yaak Ecosystem. Every BMU in the Cabinet-Yaak Ecosystem contains a portion of a large, interconnected core area block that is contiguous between adjacent BMUs. Six of 22 BMUs have core blocks of 4-8 square miles (Pulpit, Newton, East Fork Yaak, Spar, North Lightning and Mt. Headley), all of which are between four and six square miles except North Lightning (seven square miles).

[42] Conversely, a U.S. Fish and Wildlife Service biologist serving on the IGBC SCYE Access Taskforce team suggested that this figure was based on a 24 to 48 hour grizzly bear foraging area (USDI Fish and Wildlife Service 1996).

[43] An IGBC SCYE document states that SCYE "bears prefer large core polygons," with 90 percent of core use in blocks greater than ten square miles, and 95 percent of use in blocks greater than four square miles (IGBC SCYE 1997). This statement is seemingly at odds with an earlier statement from the same document that says "about 90 percent of bears used 4+ mi sq. for core." Moreover, the "ten square mile" statement misinterprets the results of the Wakkinen and Kasworm report it is supposed to have been based upon. Table 15 of the report shows that 88 percent of SE female locations, and 74 percent of CYE female core locations (half as many animals, but twice as many locations as the SE females) were in the greater than ten square mile category. The greater than 4 square mile category contained 94 percent and 89 percent of the SE and CYE female core locations, respectively. It is not clear how these numbers could be averaged out to 90 percent and 95 percent for the two categories. While the argument has been made that core blocks less than four square miles in size received "little use" in the Wakkinen and Kasworm (1997) study, blocks of this size accounted for about six percent and eleven percent of female core use in the SE and CYE, respectively.

[44] Eleven of the 22 CYE BMUs (1, 2, 3, 4, 5, 7, 9, 13, 17, 20 and 21) contained more than 55 percent core in blocks larger than four square miles in 2009. Four other BMUs (8, 12, 14 and 15) had 54 percent of the BMU in core blocks larger than four square miles. Of the remainder, BMU 10 (Pulpit) currently has 45 percent in core blocks larger than four square miles, but contains 50 percent of the BMU in core blocks larger than two square miles (the Alternative E-Updated standard is 52 percent core in this BMU). Similarly, BMU 11 (Roderick) has 49 percent in core blocks larger than four square miles, but has 51 percent in core blocks larger than two square miles and will require further improvements to reach the 55 percent standard (which may consolidate or enlarge existing smaller core blocks). BMU 16 (East Fork Yaak) has roughly 53 percent in core blocks larger than four square miles, and this percent may also increase as the BMU is brought up to the 55 percent standard. BMU 6 (Wanless) also contains 52 percent core in blocks larger than two square miles (46 percent larger than four square miles), with core increases needed to meet the proposed standard. BMU 18 (Boulder) and 22 (Mt. Headley) contain 47 percent core in blocks larger than four square miles, but this will likely increase since the addition of at least 4 percent core is needed in these BMUs. BMU 19 (Grouse) is less than 75 percent federal ownership, and is unlikely to ever contain 55 percent core habitat. Nonetheless, more than 20,000 of the current 21,285 core acres are in blocks larger than four square miles.

Table 3. Number of core blocks by size category in the Cabinet-Yaak Ecosystem, 2009

Predominant Administrative Unit	Bear Management Units (BMUs)	Core Block Size (square miles)		
		< 2	2-4	> 4
Kootenai National Forest	BMUs 1-17	87 blocks 16,511 acres 2.3%	7 blocks 14,017 acres 1.9%	21 blocks 695,596 acres 95.8%
Lolo National Forest	BMU 22	16 blocks 2,694 acres 3.2%	2 blocks 3,474 acres 4.2%	4[2] blocks 77,206 acres 92.6%
Idaho Panhandle National Forest	BMUs 18, 19, 20, and 21	26[1] blocks 4,739 acres 3.6%	1 blocks 1,302 acres 1.0%	5[1] blocks 126,789 acres 95.4%
	Total	128 blocks 23,944 acres 2.5%	10 blocks 18,793 acres 2.0%	27 blocks 899,591 acres 95.4%

[1] Indicates one core area block shared with KNF
[2]Indicates two core areas shared with the KNF

Analysis of the SE core habitat is limited to BMUs encompassed by or largely within the IPNF, and therefore does not include the LeClerc BMU (which is administered by the Colville NF) or the State Lands BMU (administered by Idaho Department of Lands). Table 4 shows the number of core habitat blocks within this portion of the SE by size category at the end of 2009. See Figure 4 for spatial distribution of core habitat by block size category in the Selkirk ecosystem.

Table 4. Number of core habitat blocks by size category in the Selkirk Ecosystem, 2009

Administrative Unit	Core Block Size (square miles)		
	< 2	2-4	>4
Idaho Panhandle National Forest **Total**	46 blocks 9,471 acres 3.1%	2 blocks 3,298 acres 1.1%	8 blocks 294,467 acres 95.8%

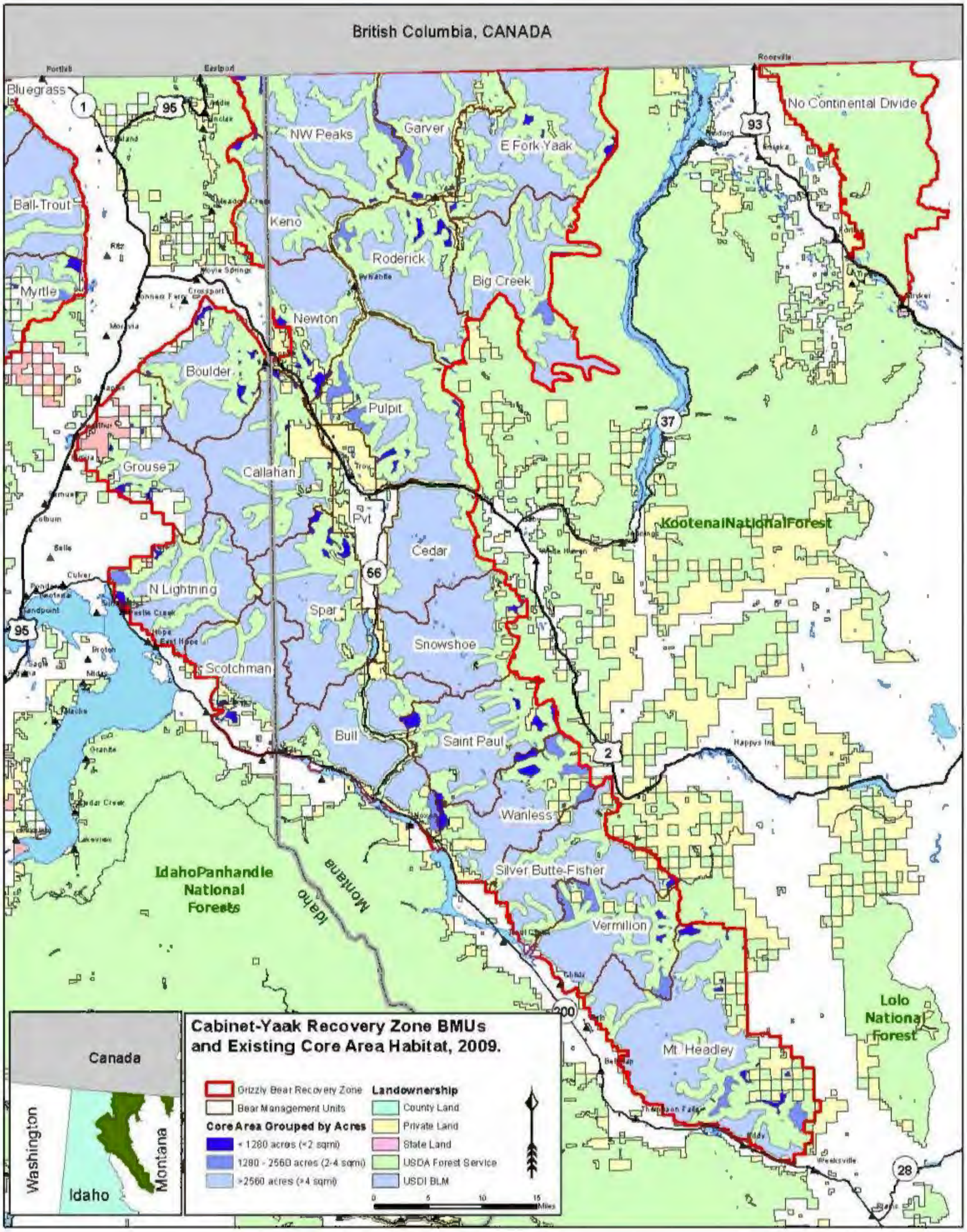

Figure 3. Cabinet-Yaak Recovery Zone core area habitat by core block size in 2009.

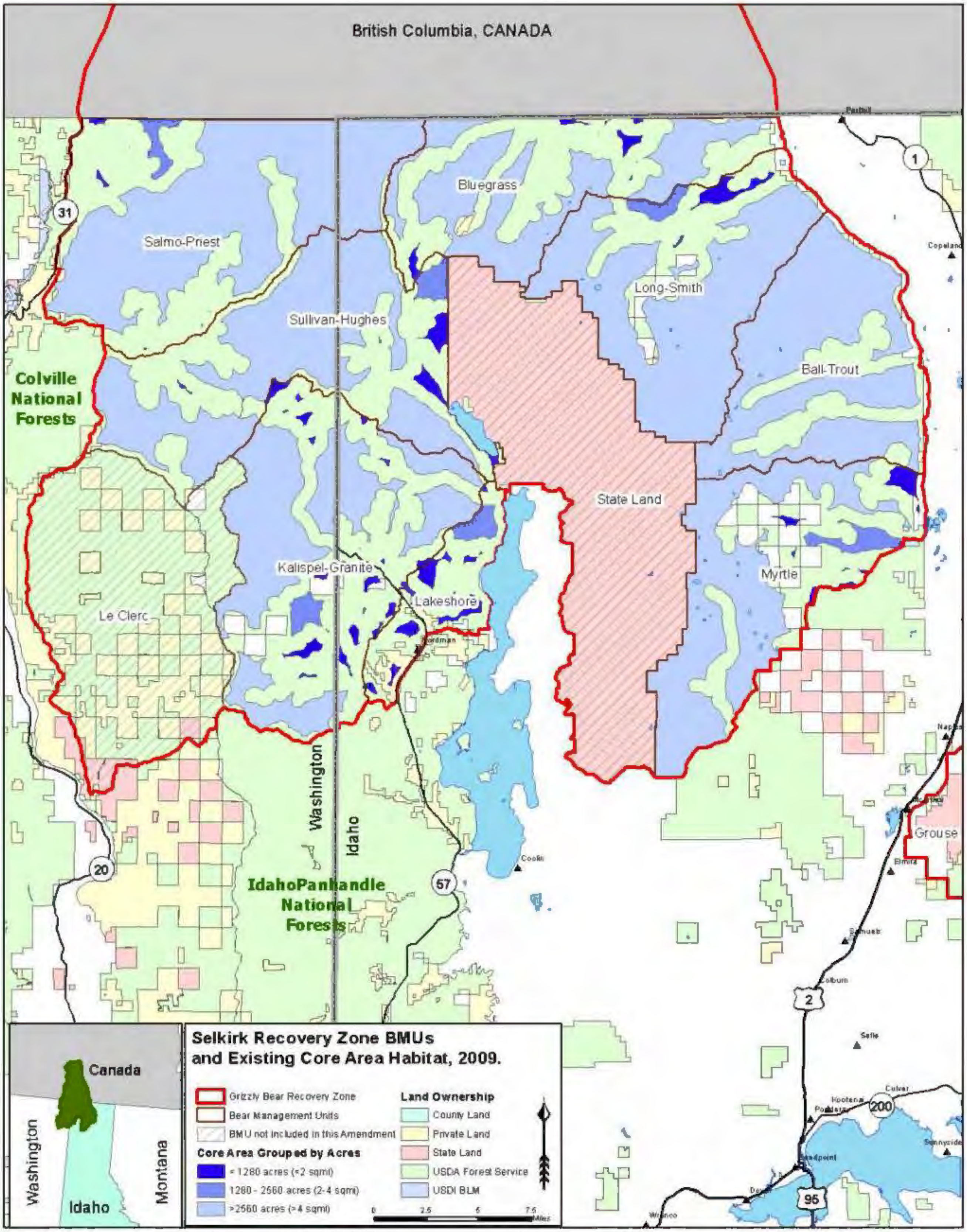

Figure 4. Selkirk Recovery Zone core area habitat by core block size in 2009.

Similar to the CYE, about 96 percent of core in the SE is in habitat blocks greater than four square miles in size. Five of the eight BMUs affected by the Forest Plan Amendments for Motorized Access[45] decision contain more than 55 percent core in blocks greater than four square miles in size. Kalispell-Granite BMU currently contains 45 percent core in larger blocks, but this number will increase to 53 percent once the Lakeview-Reeder Roads Decision is fully implemented (under contract to be completed in 2011). It has long been acknowledged that Lakeshore BMU is unlikely to meet research standards due to its small size (about 30 square miles), mixed land ownership, and high proportion of Management Situation (MS) 3 lands (USDI Fish and Wildlife Service 1993). Blue-Grass BMU currently contains about one percent core in small (less than two square miles) blocks, and will likely continue to even once the 55 percent threshold is achieved. Similar to the CYE, all SE BMUs contain large blocks of interconnected core habitat that is contiguous between adjacent BMUs. Furthermore, the issue of core blocks greater than four square miles versus core blocks greater than eight square miles is moot in the SE. Only one core block greater than four square miles (split between the Lakeshore and Kalispell-Granite BMUs) is less than eight square miles in size, and only so by less than ten acres.

Both ecosystems, taken as a whole, currently meet or exceed the percentage of core habitat in blocks greater than two square miles in size that was preferred by reproducing female grizzly bears in the Wakkinen and Kasworm (1997) study (i.e., 97 percent). This situation has improved considerably in both ecosystems since the 1989-1994 time periods[46] when their bear data were being collected (see Figures 1 through 4)[47]. Furthermore, maintaining scattered, small blocks of core habitat provides the starting point for the possibility of building larger blocks of core around those areas in the future and to connect existing core areas. In order to meet core habitat standards set forth in the Motorized Access Amendment, several BMUs in each ecosystem will have additional core created during implementation of the proposed action. It is likely that the percentage of core habitat consisting of larger blocks (greater than four square miles) could increase further.

In summary, while Wakkinen and Kasworm (1997) showed grizzly bear use increased with larger core habitat block size, they were ultimately unable to identify a block size below which grizzly bear use was less than expected (i.e., avoided). However, the percentage of core habitat in small blocks is currently low in both recovery zones and is likely to be further reduced as additional larger blocks of core habitat are created. Of the 22 Cabinet–Yaak Ecosystem BMUs, 15 contain at least 54 percent core habitat in patches larger than four square miles, and five others contain about 50 percent core in patches larger than two square miles (the lower end of the range the study authors suggested may represent a minimum area of core utility). Similarly, six of the eight Selkirk Ecosystem BMUs affected by the Forest Plan Amendments for Motorized Access contain (or will upon completion of existing projects) more than 53 percent core in blocks larger than four square miles, with core improvements in the Blue-Grass BMU likely to occur in this size category. Finally, lacking clear research evidence that core areas of smaller size are actively avoided by bears as non-core areas are, there is currently no biological basis to discount or ignore smaller blocks of core.

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[45] Forest Plan Amendments for Motorized Access Management within the Selkirk and Cabinet-Yaak Grizzly Bear Recovery Zones.

[46] For example, see Summerfield et al. (2004) Figure 9, which spatially displays growth and consolidation of core areas in the Garver BMU between 1987 and 2001.

[47] Secure grizzly bear habitat on NFS lands (i.e., core area) has increased in the Selkirk and Cabinet-Yaak recovery zones by approximately 390,015 acres (Selkirks=74,150; Cabinet-Yaak=315,865 acres) from the days of maximum road construction and use (Figures 1 and 2) to conditions in 2009 (Figures 3 and 4). **This equates to more than an 11 and 18 percent increase in overall core area in the Selkirk (U.S. only) and Cabinet-Yaak recovery zones, respectively, since implementation of habitat security measures began in the late 1980s.**

GIS and Moving Windows Data Analysis Comparisons between the SCYE and NCDE Studies

Direct comparison of OMRD: TMRD: Core findings among the Mace and Manley (1993) report, the Flathead National Forest Amendment 19 (USDA Forest Service 1994a) analysis of some of the bears from the Mace and Manley {1993} report), the Mace et al. (1996) publication, and the Wakkinen and Kasworm (1997) report, is problematic due to many differences in the way the data were analyzed and presented. These differences included: 1) GIS software used for the moving window analysis[48] to determine open and total road densities (EPPL7 versus ERDAS versus ARC/Info); 2) Size and shape of moving window (1 km^2 versus 1 mi^2 and square versus round); (3) road buffering distance (0.5 mile versus 500 meters/0.31 miles); and 4) exclusion or inclusion of private property, some motorized routes, and MS3 designated lands (Attachment B). To summarize:

- Mace and Manley (1993) ran their moving windows analyses using the EPPL7 program – an early, raster (grid)-based GIS software developed by the State of Minnesota. In the analysis for the development of Amendment 19 (USDA Forest Service 1994a and 1994b), the standards were developed using EPPL7, although the Flathead NF used ERDAS to describe their environmental baseline (ERDAS, Inc.; Atlanta, GA) – also a raster-based program, but somewhat more robust than EPPL7 – and later ARC/Info ((Ake and Allen pers. comm. 2011). Wakkinen and Kasworm (1997) used ARC/Info software (Esri, Inc.; Redlands, CA) to calculate road density values. ARC/Info is a vector (line)-based GIS, and therefore offers advantages with respect to mapping accuracy of linear features (roads) (Attachment B). All three software packages involve rasterization: a conversion of a vector feature (such as roads) to a raster feature to conduct the moving window analysis. In ARC/Info, the moving window output is then converted back to a vector feature for final percentage calculations. While EPPL7 and ERDAS use similar algorithms for rasterization, ARC/Info uses a very different algorithm. The result is that approximately 18% more cells take on the identity of the linear feature in the rasterized file when using ARC/Info compared to EPPL7 and ERDAS (Ake and Allen pers. comm. 2011). This difference in estimation of total road miles during the rasterization process is then carried over to the final density layer. Wakkinen and Kasworm (1997) calculated this "correction factor" to be 0.805[49], and incorporated it into the table used to define density classes[50].

- Additionally, the three different analyses used slightly different "windows" to determine road densities. Mace and Manley employed a 1 $mile^2$ square window (1993) and a 1 km^2 square window (Mace et al. 1996), the Flathead Amendment re-analysis used a 1 $mile^2$ square window (USDA Forest Service 1994a), and Wakkinen and Kasworm (1997) used a 1 $mile^2$ circular window (Attachment B).

While developing Amendment 19, the Flathead National Forest ran several moving window comparisons using different combinations of GIS software and input parameters (circular and square windows of varying sizes; Ake and Allen pers. comm. 2011). Regarding shape (circular versus square) of the moving

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[48] As defined originally by Turner and Gardner (1990). To determine a moving window density, motorized routes were buffered to create density contour maps based on a set pixel (cell) size. Effective road density around each pixel was determined by calculating the amount of road within a set window distance (e.g. 1 mi^2) around each pixel (Wakkinen and Kasworm 1997).

[49] Rasterization would result in one mile of road for every 0.805 actual miles.

[50] The "remap" table in the "SLICE" step.

window, their analysis found that the percentages were generally within one percent of each other, but could differ by between one and 3.5 percent about 33 percent of the time[51].

Comparison of different software packages disclosed percentage differences that were somewhat larger still between the different software than between differing window shapes. Besides the raster- and vector-based programs using different algorithms to rasterize vector features (discussed above), EPPL7 also had a tendency to place more cells in lower density classes than ERDAS when running identical datasets. This would result in lower density estimates for OMRD and TMRD when using EPPL than when running the same data using ERDAS. The author of the Flathead Amendment 19 analysis protocol cautioned that "*the same software package must be used for all analyses so that results are comparable*" (Ake and Warren 1995).

We did not have access to direct comparisons between a 1 mi^2 versus 1 km^2 window size. This would be impossible to do after the fact, since the results would have to be converted to like units prior to being placed in the various density classes. It is unclear how this would affect the higher density classes used for OMRD and TMRD calculations, but it is obvious from our cursory analysis, and from the analysis done for Flathead Amendment 19, that relatively more cells fall into the "0.0" category with smaller window sizes (1 km^2 compared to 1 mi^2.

The IGBC recognized the differences in research, data collection, and analysis among the various grizzly bear research efforts, and noted that, "as such, the data sets lend themselves to dissimilar analysis with which to develop access management strategies" (IGBC 1998). Despite this assessment, many comparisons have been made between the Wakkinen and Kasworm (1997) results and the standards established for the Flathead National Forest Amendment 19. In the 2006 litigation, plaintiffs drew attention to the comments made by biologists from the Spokane U.S. Fish and Wildlife Service office. In one instance, a biologist made the suggestion to "average" the results from the two studies in 1998 after the Access Taskforce team presented the results of the Wakkinen and Kasworm study to the SCYE IGBC subcommittee (USFWS 1998). No rationale was provided by this biologist to support pooling information from the two studies. Subsequent discussion and review by the SCYE Subcommittee members (of which the Spokane USFWS Field Supervisor was a member) in 1999 resulted in unanimous support of the Interim guidelines and rule set based on the Wakkinen and Kasworm study results alone. The Spokane USFWS office later used Wakkinen and Kasworm (1997) as the "best available indication of habitat conditions used by grizzly bears in the Selkirk and Cabinet-Yaak Ecosystems" in completing their 2001 amended Biological Opinion regarding the continued operation of the Idaho Panhandle National Forest Plan (USFWS 2001).

In conclusion, each of the OMRD:TRMD:core area analyses were conducted using different GIS software and parameters, and the three methods should not be expected to reliably produce similar results from identical data. Notable differences in the amount of core area (i.e., 68 percent—Flathead Amendment 19) versus roadless areas (i.e., 46 and 56 percent—Mace and Manley 1993; Mace et al. 1996) to describe the composite home range of South Fork Flathead River female grizzlies bears from 1987-1992 and 1990-1994, respectively, demonstrates how differences in data analysis parameters, software, and the pool of female bears used in the evaluation can contribute to very different results. Attempting to "pool" road density data with research from the Selkirk and Cabinet-Yaak Ecosystems that incorporated not only completely different software, but differing criteria for inclusion/exclusion of roads and habitat areas—

[51] Results were compared across 14 BMUs. Using a 1 mi^2 window, 6 of 14 BMUs had >1% error in the ">2" column (representative of what is reported for TMRD), but only 2 of 14 had >1% error in the added ">2" and "1.1-2.0" columns (representative of OMRD) – resulting in >1% error 29% (8 of 28) of the time. Using a 1 km^2 window size, 8 of 14 BMUs had more than 1% error in the ">2" column, and 2 of 14 in the added ">2" and "1.1-2.0" columns – giving a >1% error rate of 36% (10 of 28).

let alone significant differences in habitat selection as reflected in dramatically different home range sizes—is biologically unsound and statistically problematic.

Conclusions

We conclude that the Wakkinen and Kasworm (1997) report provides the best data available for determining recommendations for the management of grizzly bear habitat in relationship to motorized routes for the Selkirk and Cabinet-Yaak Ecosystems. The subject bears included six female grizzly bears that successfully produced at least two or more offspring before or during the research period (1989-1994) and represented 15 percent of the estimated population of grizzly bears occupying the two ecosystems at that time. Sample sizes were small, but were in line with the South Fork Flathead River research efforts examining the same relationship between grizzly bears and roads. This was a reflection of the difficulty in researching a wide-ranging and low density animal and was not a result of a lack of effort to obtain a larger sample size of successfully reproducing female grizzly bears within the SCYE. In addition, inclusion of some habitat selection data from the one study bear that was an independent subadult for one year of the study did not alter the results of the analysis, because she continued to use the same general home range area even after maturing.

The Wakkinen and Kasworm (1997) study bears represented a "successful" portion of the population based on documented reproduction by all six bears. Indeed, bear 106 is known to have produced 13 cubs from the time of her capture in 1986 until her death in 1999. Moreover, at least five of the six bears are known to have produced cubs that survived to dispersal with at least four female cubs successfully producing cubs during—and well after—the study was completed. Likewise, the death of two Selkirk study bears at the hands of hunters after the study was completed does not render their habitat selection data invalid or biased, as the selection of more secure habitat would not have necessarily prevented these mortalities. It is clear from research in the North Continental Divide, Selkirk, Cabinet-Yaak, and Yellowstone Ecosystems that human-caused grizzly bear mortality is not a simple function of the availability of motorized access. Rather, grizzly bear mortality risk is also heavily influenced by the existence of state and provincial authorized big game hunting seasons, the availability of human-produced attractants that draw in and potentially habituate grizzly bears, and the amount and juxtaposition of private property and its associated development.

Furthermore, while the researchers did not evaluate home range selection in relationship to motorized routes within the entire recovery zone (i.e., second order selection) our examination of the six home ranges in relationship to a conservative picture of core areas available during the late 1980s demonstrates that the study bears did indeed have other large areas devoid of motorized routes that they could have utilized throughout ecosystem in the early 1990s. Many of these unroaded habitats were as large—or larger—than the observed multi-annual home range sizes of the six bears and included a range of habitats by elevation, slope, aspect, and cover type. This information supports our conclusion that the road density and core area results from the Wakkinen and Kasworm (1997) research are a reflection of bears choosing these areas—and their associated road densities—and not an indication of a lack of opportunity to select home ranges characterized by lower road densities.

Wakkinen and Kasworm (1997) were unable to determine if a minimum effective core block size existed from their data. Likewise, a minimum core block size similarly was never established for the South Fork Flathead River research, although the Flathead National Forest's selection of 2,500 acres appears to have some connection with the preliminary radio-telemetry findings as of 1993. Regardless, only a small proportion of BMUs in the Selkirk and Cabinet-Yaak Ecosystems contain core in patches smaller than 2,500 acres, and the current overall distribution of core size in both of these ecosystems closely reflects that used by reproducing female bears in the Wakkinen and Kasworm (1997) study. While it is possible that core blocks of larger size may be preferred by grizzly bears, there presently is insufficient justification for dismissing smaller core blocks in the Selkirk and Cabinet-Yaak Ecosystems.

Finally, results of research conducted in the Selkirk and Cabinet-Yaak Ecosystems (Wakkinen and Kasworm 1997) are difficult to directly compare against those used to develop the Flathead National Forest's Amendment 19 for a number of reasons. Different software packages and moving windows analysis parameters have been shown to produce contradictory results up to one-third of the time. Additionally, contrasting differences in land ownership patterns within the composite grizzly bear home ranges between the two studies likely influenced the resulting habitat use patterns in regards to available motorized routes, making direct comparison inadvisable and problematic.

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Kathy Ake (August 2011)

Attachment A. Summary of known productivity, relationship among study animals, and causes of death for the female study bears used in the Selkirk/Cabinet-Yaak and South Fork Flathead River grizzly bear projects. Gray shaded areas represent the time period that individual bear relocation data was included in the respective study for evaluation of habitat selection in relation to roads. Data from Kasworm et al. 2009, Mace & Manley 1993, Mace et al. 1996, Mace & Waller 1997, and Wakkinen & Johnson (2000). NA=Not Applicable; Unk=Unknown (dropped/failed collar).

Ecosystem	Bear ID#	Year		Age[1] OR Productivity of radio-collared female grizzly bears (number young/age of young)										Status[2]	Comments
		1[st] Captured	Born	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994		
Selkirk	867	1983	1978	2/0.5	1/1.5	2/0.5	2/1.5	2/2.5		1/0.5	2/1.5	2/0.5	NA	Dead	Poaching mortality 11/93
	1015	1985	1980	A	A	2-0.5	2/1.5	2/2.5	2/0.5	2/1.5	2/2.5	NA	NA	Dead	Self Defense mortality 9/92
	1984	1987	1969	-	-	2/2.5	A	A	A	A	Unk	Unk	Unk	Unknown	Collar failed 10/91
	1087	1987	1979	-	-	A	A	3-0.5	Unk	Unk	Unk	Unk	Unk	Unknown	Collar dropped 9/89
Cabinet - Yaak	106[a]	1986	1978	-	2/0.5	1/1.5	3/0.5	3/1.5	3/2.5	2/0.5	2/1.5	2/0.5	2/1.5	Unknown	Collar dropped 7/94
	206[a]	1990	1988	-	-	-	-	-	SA	SA	SA	A	2/0.5	Unknown[3]	Collar failed spring of '94
Northern Continental Divide South Fork Flathead River Study	1[b]	1987	1975	-	-	2/1.5	2/2.5	NA	NA	NA	NA	NA	NA	Dead	Mistaken ID mortality 5/88.
	97	1988	1972	-	-	-	A	NA	NA	NA	NA	NA	NA	Dead	Natural causes 9/88
	14	1989	1977	-	-	-	-	A	2/0.5	2/1.5	2/2.5	Unk	Unk	Unknown	Unsure of status after 1992
	5	1987	1979	-	-	A	A	A	A	1/0.5	1/1.5	1/2.5	Unk[4]	Active	Unsure of status after 1993
	45	1990	1970	-	-	-	-	-	A	1/0.5	1/1.5	1/2.5	Unk[4]	Active	Unsure of status after 1993
	48[c]	1990	1979	-	-	-	-	-	A	2/0.5	2/1.5	2/2.5	Unk[4]	Active	Unsure of status after 1993
	94	1988	1979	-	-	-	A	2/0.5	2/1.5	2/2.5	1/0.5	1/1.5	1/2.5	Active	
	96[d]	1988	1972	-	-	-	3/1.5	3/2.5	A	2/0.5	2/1.5	2/2.5	2/3.5	Active	
	143	1988	1982	-	-	-	A	A	A	2/0.5	NA	NA	NA	Dead	Natural death w/cubs in 5/91
	3[b]	1987	1986	NA	NA	SA	SA	SA	SA	A	A	NA	NA	Unknown	Collar dropped ≤1992
	8[c]	1993	1991	NA	NA	NA	NA	NA	NA	-	-	SA	SA	Active	
	18[d]	1990	1987	NA	NA	NA	NA	NA	SA	SA	1/0.5	1/1.5	1/2.5	Active	
	26	1992	1987	NA	NA	-	-	-	-	-	A	A	A	Dead	Mistaken ID mortality, 9/94
	69	1992	1988	NA	NA	NA	-	-	-	-	SA	A	A	Active	
	137[d]	1988	1987	NA	NA	-	SA	SA	SA	SA	A	NA	NA	Unknown	Collar failed ≤1992
	147[b]	1987	1986	NA	-	SA	SA	SA	2/0.5	2/1.5	2/2.5	A	NA	Dead	Management Removal mortality 9/93

[1] A = Adult; SA = Subadult (<5 years old)
[2] Known status at completion of project.
[3] Known to have successfully produced at least two sets of cubs from 1994-1999
[4] Unsure whether this bear was still collared/alive in 1994. This review assumes these 3 bears were likely alive and part of the South Fork Study in 1994.

[a] Indicates Cabinet-Yaak ecosystem mother/daughter relationship
[bcd] Indicates Northern Continental Divide ecosystem mother/daughter relationship

Mace and Manley (1993) bears (N=9 bears)   Flathead Amendment 19 (1994) bears (N=7 bears)   Mace et al. (1996) bears (N=13 bears)

Attachment B. Summary of data analysis and biological data used in the South Fork Flathead River study in the Northern Continental Divide grizzly bear recovery zone versus the Selkirk and Cabinet-Yaak recovery zones.

	Grizzly Bear Study Area Research Parameters	Grizzly Bear Ecosystem, Research Effort Authors, and Reporting Method			
		Northern Continental Divide (Mace and Manley 1993) *Progress Report*	Northern Continental Divide Flathead NF Amendment 19 *Additional Characterization of Mace & Manley data for FS document by R. Mace*	Northern Continental Divide (Mace et al. 1996) *Journal Article*	Selkirk/Cabinet-Yaak (Wakkinen and Kasworm1997) *SCYE IGBC Report*
Study Area	Recovery Zone Area (mi^2)	9,575 mi^2- NCDE	9,575 mi^2- NCDE	9,575 mi^2- NCDE	2,200 mi^2-Selkirk Mountains (US/BC) 2600 mi^2- Cabinet-Yaak (US)
	Study Area (mi^2)-Multiple Use	563 mi^2- S. Fork Flathead	563 mi^2- S. Fork Flathead	563 mi^2- S. Fork Flathead	829 mi^2 (composite home range of 6 bears)
	Land Ownership of Composite Home Range	National Forest only	National Forest only	National Forest only	Mixed Ownership—NFs, B.C. provincial lands, Idaho state lands, industrial forests, & private
	Study Period	1987-1992	1987-1992	1990-1994	Selkirks:1989-1991 / Cabinet-Yaak:1990-1994
Data Analysis & Access Parameters	Home Range Estimator	CALHOME—95% Adaptive Kernal	CALHOME—95% Adaptive Kernal	CALHOME—95% Adaptive Kernal	CALHOME—95% Adaptive Kernal
	Type of Data Used to Quantify Habitat Use	3rd Order—Composite Multi-Year	No	Partial 2nd Order--Composite Multi-Year 3rd Order—Individual Multi-Annual	3rd Order—Individual Multi-Year Average
	Use:Availability Order of Selection Completed[1]	Partial 2nd Order 3rd Order of Selection	No	Partial 2nd Order 3rd and 4th Order of Selection	3rd Order of Selection
	Open Motorized Route Density (OMRD) >1.0 mi/mi^2	Males + Females = **13%**	**19%**	Not reported--*"Not the author's aim to evaluate sensitivity of varying road density scales to grizzly"*	**33%** (Individual values for six female grizzlies = 28.1, 34.9 16.7, 35.4, 34.5, and 51.5%)
	Total Motorized Route Density (TMRD) >2.0 mi/mi^2	Males + Females = **22%** Females only = **18%**	**19%**	Not reported--*"Not the author's aim to evaluate sensitivity of varying road density scales to grizzly"*	**26%** (Individual values for six female grizzlies = 25.1, 27.3 14.3, 23.8, 27.7, and 38.2)
	Description of non-motorized areas available in the Home Range	**46% Unroaded**	**68% Core Area**	**56% Roadless Area**[2]	**55% Core Area** (Individual values for six female grizzlies = 40.0, 53.3, 53.4, 53.7, 55.3, and 71.5%)
	GIS Software	**EPPL7** 1-mi^2 square window	**EPPL7**[3] 1-mile^2 square window	**EPPL7** 1-km^2 square window	**ARC Info** 1-mile^2 round window
	Road Buffer	**0.5 miles**	**500 meters/0.31 miles**	**NA**	**500 meters/0.31 miles**
Biological Data	Estimated Population Size	Recovery Zone: 306 (USFWS 1993) Project Area: 36-48	Recovery Zone: 306 (USFWS 1993) Project Area: 36-48	Recovery Zone: 306 (USFWS 1993) Project Area: 36-48	Recovery Zone: 40 (USFWS 1993) (i.e., 25 Selkirks; 15 Cabinet-Yaak)
	Average Home Range Size	Average (Range) = **48** (18-105) sq. miles (derived from 10 females used in the overall study)			Average (range) = **120** (83-335) sq. miles
	# of Females/Average Age[4]	**9 / 13.1 years old**	**7 / 12.5 years old**	**13 / 10.9 years old**	**6 / 11.5 years old**
	Age Distribution of Females[5]	9 Adults	7 Adults[6]	6 Adults: 7 Subadults[7]	5 Adults:1 Subadult[8]
	% Representation of Total Estimated Population	NCDE Recovery Zone: < 3% Project Area: 19-25%	NCDE Recovery Zone: < 2 % Project Area: 15-19%	NCDE Recovery Zone: 4% Project Area: 27-36%	SCYE Recovery Zone;15% (Larger project included 38% of total pop.)
	Reproduction	Yes-8 females produced cubs	Yes-all 7 females produced cubs	Yes-8 females produced cubs	Yes-all 6 females produced cubs
	Mortality During Study Period?	Yes-3 mortalities (1 Human; 2 Natural)	Yes-1 natural mortality	Yes, 2 females killed in 1993 & 1994[9]	No
	Mortality After Study Period?	No	No	No	Yes- 2 Selkirk bears killed in 1992-93[10]

[1] Resource section includes first order (geographic range of a species), second order (individual home range within a geographical range), third order (use of habitats within the home range), and fourth order (use of particular elements within the home range) (Johnson 1980).

[2] Mace et al. (1996) reported "roadless areas" (0 km/km^2).

[3] Described as being analyzed by R. Mace (EPPL7) using Forest Service data (USDA Forest Service 1994a, 1994b; Allen and Ake pers. comm. 2011).

[4] Average age was determined by computing the average age of study bears each year of the study and then calculating the average for the study period.

[5] Grizzly bears are considered as adults at age five, although Mace and Waller (1997) documented reproduction of one of their female grizzlies at age four.

[6] Assumes that three females (#1, #44, and #97) that died of human and natural causes were not included in this subset of the Mace and Manley (1993) females.

[7] Seven bears were included in the 1990-1994 study effort that were subadults when first collared. In no single year did subadults outnumber the adults in the study sample. This resulted in a ratio of adults:subadults of 7:3 in 1990, 8:2 in1991, 10:1 in 1992, 9:1 in 1993, and 8:1 in 1994.

[8] Bear 206 was a subadult for two (1991-92) of the three years (1991-1993) she was used in the study.

[9] Bear 147 was destroyed in a management removal after becoming habituated to humans. Two of her offspring (male and female) were destroyed in 1992 for the same reason. Bear 26 was killed in a mistaken identity shooting in 1994.

[10] Bear 1015 was shot in a self-defense killing in B.C. in 1992; bear 867 was shot in a malicious killing in 1993.

APPENDIX 10

BACKGROUND

Discussions both internally with engineers and resource specialists, and externally with the public and residents of the West Kootenai community, have highlighted the need for more information and further analysis regarding a boat ramp facility, including a boat ramp, toilet and parking facility, on the West Kootenai. This appendix is to analyze two additional locations recommended by public and resource specialists for their suitability for a boat ramp location. These two additional sites are located at Poverty Creek and Sand Hill (see following map). The analysis for a ramp location at Young Creek Bay is included in the main body of the document.

Poverty Creek

Installation of a boat ramp and parking area at Poverty Creek would include construction of approximately 0.75 miles of road, a 2.5 acre parking lot, and installation of toilet facilities. Installation of a boat ramp at Poverty Creek would require an equal amount of road closures/decommissioning within the West Kootenai Bear Outside Recovery Zone (BORZ) to maintain baseline conditions for the BORZ established in the 2011 Access Amendment. The Young Dodge project already proposes to decommission five currently open roads totaling 1.93 miles. The roads proposed for decommissioning are 7221, 7972D, 7218E, 7213D, and 7211B. A boat ramp at this location would create a new access point to the reservoir. The Poverty Creek location is in Management Area 11.

Sand Hill

The potential ramp location at Sand Hill already has road access, however the road would need to be improved and five to six turnouts installed to provide for safety. There is currently separate funding to install a toilet at this location that is not associated with a boat ramp. An approximately two acre parking lot would be constructed. This is currently a popular beach for swimming. The Sand Hill location is also in Management Area 11.

Analysis of Boat Ramp Locations

Soil and Water Resources

Previous Analysis of the Young Bay Site

The proposed boat ramp accessing Koocanusa Reservoir would be expected to disturb approximately one acre. The majority of soil disturbance would result from the creation of a parking lot. The boat ramp and associated development is considered part of the transportation network and therefore does not contribute to the 15% detrimental soil disturbance standard.

The proposed boat ramp would clear approximately one acre. The boat ramp itself is primarily below high pool on Koocanusa Reservoir. This would not degrade water quality in the reservoir because most of the area is currently exposed sand. The existing road into the proposed boat ramp would be realigned and improved. The only new disturbance above full pool would be a small parking area. The road upgrades and the addition of a small parking area are expected to have little effect on water quality. The amount of sediment generated would not be measurable in comparison to the amount of annual shore erosion along the reservoir.

Comparison of Young Bay, Sand Hill, and Poverty Creek Sites

Soil Disturbance

Regional soil quality 15% standard (FSM 25000-2009-1) does not include the disturbance associated with the permanent transportation network or administrative sites. Therefore, the Regional Quality Standards are met. However, NFMA and NEPA require disclosure of effects to soils, in particular to soil productivity. Table 1 discloses the amount of area for each site that will be taken out of the productive land base and become part of the Authorized Forest Road (36 CFR 212) network.

Table 1 Soil Disturbance from Proposed Boat Ramps

Disturbance	Young Bay	Sand Hill	Poverty Creek
Acres New Road Construction	0	0	4.6
Acres of Parking Area	2	2	2.5

Peak Flow

There is a very low risk of any of the three proposed boat ramps affecting peak flows within the Planning Subunit. The areas are small in size and would result in few ECAs because most of the locations involved are mostly open or have no vegetation (areas below high water mark). In addition, all of the proposed sites are on relatively dry sites, less than 20 inches of precipitation annually, and drain directly into the reservoir. Therefore, none of the proposed boat ramp locations would have an effect on peak flows.

Water Quality

Watersheds in the Analysis Area contribute surface flow to Koocanusa Reservoir, which is listed as a WQLS. The beneficial use concerns for Koocanusa Reservoir are aquatic life and cold water fisheries. The Koocanusa Reservoir was listed due to flow alteration caused by the Libby Dam not as a result of forest practices or management. Future management actions will not affect the existing flow alteration.

A large portion of all three boat ramps would be below high pool on Koocanusa Reservoir. These portions of construction would not degrade water quality in the reservoir because most of the area is currently exposed sand. However, the portions of the boat ramps above high pool would differ with regard to miles of road construction, miles of road BMP improvements, acres of parking lot, and acres of RHCA conversion (Table 2).

Table 2 Activities with the Potential to Affect Water Quality

Activity	Young Bay	Sand Hill	Poverty Creek
Miles New Road Construction	0	0	0.75
Miles of Road BMP Improvement	1	1	0
Acres of Parking Lot/Ramp	2	2	3.5
Acres of RHCA Conversion	1	0	4

The boat ramp locations differ primarily as a result of the amount of new disturbance above full pool on the reservoir. None of the three sites are expected to have a measureable effect on water quality within the reservoir given the size of waterbody (90 miles long) and the amount of sediment generated would not be measurable in comparison to the amount of annual shore erosion along the reservoir. However, the differences between boat ramp sites are as follows:

Sand Hill would have no new road construction and would improve 1 mile of road. There would be 2 acres of new disturbance for the parking lot but none of it would be within the RHCA. In addition, the road already exists down through the RHCA so the boat ramp area would not remove any additional RHCA. Sand Hill would have the least disturbance and lowest potential for sedimentation of the three sites.

Young Bay would have no new road construction and would improve 1 mile of road. There would be 2 acres of new disturbance for the parking lot but none of it would be within the RHCA. One acre of RHCA would be converted due to the road realignment. Young Bay would have disturbance levels and risk of sedimentation between that of Sand Hill and Poverty Bay.

Poverty Creek would have 0.8 miles of new road construction but would not improve conditions on existing roads like the other two locations. Four and a half acres of riparian are would be converted to administrative site including 2.5 acres of parking lot, 1 acre of road going to the ramp, and 1 acre of a small RHCA that the road encroaches on outside the reservoir. The 1 acre RHCA encroachment would need an RHCA modification (see Fisheries Analysis). Poverty Creek would have the most disturbance and highest potential for sedimentation of the three sites.

Summary

In summary, none of the proposed boat ramp locations are expected to have an effect with regard to peak flows. However, the sites would have varying levels of effects to soils, RHCAs, and sedimentation. Overall, the effects from implementation of any of the boat ramp sites would be immeasurable when compared to the amount of annual shore erosion along the reservoir.

Consistency with Regulatory Framework

The Forest Plan states that project plans for activities requiring the use of ground-based equipment will establish standards for the area allocated to skid trails, landings, temporary roads, or similar areas of concentrated equipment use (USDA Forest Service 1987a). Forest Service Manual 2500-99-1 establishes guidelines that limit detrimental soil disturbance to no more than 15 percent of an activity area. Implementation at any of the boat ramp sites would meet Forest Plan and Regional Soil Standards because administrative sites and the permanent road system are not included in the 15%.

All alternatives are consistent with Kootenai Forest Plan direction for maintaining water quality and quantity. Implementation of any of the boat ramp sites would at maintain the support of beneficial uses as the actions would not affect the reasons for listing the Koocanusa Reservoir.

Both RHCAs and SMZs will be affected in varying amounts by construction of the proposed sites. INFISH allows recreation sites to be constructed within the RHCA as long as effects are minimized. See Fisheries Section for further discussion. The appropriate permits for working within the SMZ will be attained from Montana DNRC if applicable.

Section 404 of the CWA authorizes the Secretary of the Army to issue permits for the discharge of dredged or fill material into wetlands (33 CFR 323). A 404 permit will be attained prior to boat ramp construction and the conditions of the permit will be adhered to throughout implementation of the selected site.

Other permits that may be needed include, but are not limited to: Montana Stream Protection (124), Federal Rivers and Harbors (Section 10), Short-Term Water Quality Standard for Turbidity (318 Authorization), Montana Floodplain and Floodway, Montana Land-use and License or Agreement on Navigable Waters, and/or Stormwater Discharge Permits.

Vegetation and Disturbance Processes

Construction of a boat ramp at Poverty Creek would include 0.75 miles of road construction which would include land clearing of turnouts; approximately 4.55 acres of land will be affected by this construction. Additionally 2.5 acres of land would be cleared for parking, boat ramp and restroom. These activities wouldl have site specific effects on the structure and function of the onsite vegetation. Complete removal of vegetation would occur at these sites to accommodate new recreational facilities. Effects to vegetation would occur on less than 1% of the project area.

Construction of a boat ramp at Sand Hill would include land clearing of turnouts (~0.2 acres). Approximately two acres of land would be cleared for parking, boat ramp and restroom. These activities would have site specific effects on the structure and function of the onsite vegetation. Complete removal of vegetation would occur at these sites to accommodate new recreational facilities. Effects to vegetation would occur on less than 1% of the project area.

Sand Hill and Young Creek Bay would have approximately the same effects to the vegetation. Poverty Creek would have a greater impact due to the construction of the road in addition to the facilities. Effects to the vegetation resource would occur on less than 1% of the project area for all alternatives.

Noxious Weeds

The Kootenai NF has three categories of noxious weeds. Category 1 weeds generally are widespread populations. The goal for weeds in this category is to contain weeds inside infested areas and reduce plant populations. Examples of plants in this category include spotted knapweed and oxeye daisy. Category 2 weeds are classified as new invaders. The goal for weed control in this category is to eradicate small infestations and reduce larger infestations. An example of Category 2 weeds are leafy spurge or rush skeletonweed. Category 3 weeds are potential invaders. No known Category 3 weeds are known to occur on the Forest. If they were found, the goal is to eradicate promptly.

Only Category 1 weeds are found in the vicinity of this project. Lower elevation, drier sites such as this project area are at increased risk of noxious weed establishment and spread compared to more shaded, moist sites. The most common weeds found in the area are knapweed and mullein. This project would cause soil disturbance on approximately 7 acres. This disturbed area could be conducive to noxious weed establishment and spread.

Mitigation efforts would consist of:

- All off-road equipment would have to be washed and inspected by Forest Service personnel prior to operating on the project
- Mineral soil exposure in the right-of-way would be minimized to reduce potential seed establishment sites

- Disturbed areas would be seeded with a certified KNF seed mix to reduce potential noxious weed establishment sites
- Disturbed areas created by the construction of the access road and parking lot would be put on an annual weed monitoring program to help ensure any weeds that became established would be treated with herbicide to prevent spread

Fuels

The effects of the placement of the boat ramp for fuels are similar for each location. The clearing of land would be similar at all sites. Fuels would be eliminated at all sites in approximately the same acreages. Due to new road construction, Poverty Creek would clear an additional 7 acres of land for road construction and a parking area. Sand Hill would clear approximately 0.2 acres of land for additional turnouts. The boat ramp sites would likely be very similar in size. Cumulatively, this project would have no measurable effects to fuels in the Young Dodge Project Area. Clearing 1-2 acres of land along Koocanusa Reservoir would not produce a measurable effect at the landscape scale. Locally, it would prevent any fire starts in the surfaced areas that are currently available to burn.

Air Quality

The effects of the placement of the boat ramp for air resources are similar for each location. The clearing of land that would have to be piled and burned would be similar at each location. The only measurable differences would be the amount of tree removal that would be required for road construction. Longer roads would likely require more trees to be removed and more slash to be burned. Young Bay would require no additional tree removal for road construction. Sand Hill would require a few trees to be removed for 5-6 additional turnouts. Poverty Creek would require the removal of approximately 7 acres of timber to accommodate the clearing widths for a new road. Because the road is located in a previously managed stand, tree densities are not high, resulting in fewer trees being cut. However, because all burning activities are required to comply with the Montana/Idaho State Airshed Group, all burning would be done on days where smoke dispersion would be at acceptable levels in order to limit impacts to local residents.

Road length contributes to fugitive road dust, which can impact local communities. Young Bay is close to the most residences and has a 2 mile long road. Sand Hill is close to fewer residences than Young Bay but is shorter at 1 mile long. Poverty Creek is close to the fewest residences and would be 0.75 miles long. Poverty Creek would likely contribute the least amount of road dust and would impact the fewest residences of all the alternatives.

Cumulatively, there are only minor, insignificant differences between the alternatives. This is due to a similar amount of land clearing in all the alternatives. Particulate levels under all alternatives would be at acceptable levels due to compliance with the Montana/Idaho State Airshed Group recommendations regarding when burning is allowed.

Fisheries

Effects Analysis

Comparison of Young Bay, Sand Hill, and Poverty Bay Sites

Effects to Riparian Management Objectives (RMO's)

Table 1 discloses the amount of area for each site that will be taken out of the productive land base and become part of the Authorized Forest Road (36 CFR 212) network. No new road construction would be needed to place a boat ramp at Young Bay or Sand Hill, and both of these sites would require 2 acres of disturbance for parking space and as ramp. However, by placing the ramp at Young Bay, 1 acre of riparian area would be converted. At Poverty Bay, a relatively small amount of new road construction would be required, with 3.5 acres of disturbance needed for parking and a ramp. In addition, 4 acres of riparian area would be converted at Poverty Bay (3 acres of RHCA along Koocanusa Reservoir and 1 acre near an upland seep).

Table 1. Activities with the Potential to Affect Riparian Management Objectives (RMO's)

Activity	Young Bay	Sand Hill	Poverty Bay
Miles New Road Construction	0	0	0.75
Acres of Parking Lot/Ramp	2	2	3.5
Acres of RHCA Conversion	1	0	4

The placement of a boat ramp at Poverty Bay would have the greatest effect on RMO's among the three proposed sites. Riparian vegetation would be removed to accommodate parking areas, road construction and the proposed ramp. The removal of the riparian vegetation would not affect pool frequency or width-to-depth ratios because the adjacent waterbody is a large reservoir, not a stream. Removal of riparian vegetation has the potential to increase water temperature; however, at this site, the relative amount of vegetation and canopy removal will have negligible effects on the water temperature of a 90-mile long reservoir. Riparian vegetation removal would affect future recruitment of large woody debris from the proposed ramp site. Trees cleared for parking and a ramp would not be available for recruitment into Koocanusa Reservoir. However, the relative amount of tree removal compared to the available intact riparian area surrounding Lake Koocanusa is very small. Few trees would have to be removed, given the site is relatively dry (less than 20 inches of precipitation) and dominated by widely spaced ponderosa pine.

Effects to RMO's from placing a boat ramp at Young Bay and Sand Hill would be less than those identified at Poverty Bay. One acre of riparian conversion would occur if the boat ramp was placed in Young Bay. Similar to Poverty Bay, a small amount of large woody debris would be removed and not available for future recruitment; however, the effects from this would be minimal, given the small scope of the project and dryness of the site. No effects to RMO's are expected from the placement of the boat ramp at Sand Hill because no riparian area would be converted.

The boat ramp locations differ primarily as a result of the amount of new disturbance above full pool on the reservoir. None of the three sites are expected to have a measureable effect on aquatic habitat within the reservoir given the size of waterbody (90 miles long) and the relatively small scope of the disturbance and riparian conversion.

Given the lack of anticipated effects to aquatic habitats from any of the proposed boat ramp locations, no effects to bull trout (threatened) or westslope cutthroat (sensitive) residing in Lake Koocanusa are expected. The limited scope of activities and relative amount of riparian conversion are not expected to affect fish populations directly. Indirectly, a new boat ramp may increase angling pressure on Lake Koocanusa; however, all anglers are still bound by state angling regulations. Lake Koocanusa does not provide habitat for western pearlshell mussels (sensitive), as this species occupies small to mid-sized streams.

Wildlife Resources

Old Growth

Additional locations analyzed for the proposed boat ramp include Sand Hill and Poverty Creek. There are no old growth areas mapped for these areas, therefore there would be no impacts on this resource during construction of this facility.

Snags

The 0.75 miles of road construction associated with the proposed boat ramp at Poverty Creek (<5 ac) may result in a minimal loss of trees and snags to accommodate safe vehicle access. Likewise, vehicle turnout (< 1 ac) construction to access the Sand Hill boat ramp location would also result in the removal of both live and dead standing trees. The associated parking lot and restroom would also affect approximately 2.5 ac of live and dead trees depending upon the specific location chosen. Due to the anticipated level of snag loss (7 ac total), impacts to the snag capability of the PSU and associated species are considered negligible.

Down Wood

The 0.75 miles of road construction associated with the proposed boat ramp at Poverty Creek (<5 ac) may result in a minimal loss of down wood and snags to accommodate safe vehicle access. Likewise, vehicle turnout (< 1 ac) construction to access the Sand Hill boat ramp location would also result in the removal of both down wood and dead standing trees. The associated parking lot and restroom would also affect approximately 2.5 ac of live trees, dead standing trees, and possibly some dead down material, depending upon the specific location chosen. Due to the anticipated level of down wood/snag loss (7 ac total), impacts to the snag capability of the PSU and associated species are considered negligible.

MIS Elk

Direct and Indirect Effects - Action Alternatives

Cover/Forage Ratios

The Sand Hill and Poverty Creek boat ramp access routes, parking lot and restroom, would have no measurable impact on the cover to forage ratio for elk due to either their limited scope (7 ac) or by lack of quality hiding cover for this species within the dry ponderosa pine forest type.

Open Road Density and Habitat Effectiveness

Neither the Sand Hill nor Poverty Creek access routes to potential boat ramp location would impact these habitat measurement indicators as they are either outside of MA 12 summer range or would have no measurable change on the existing road densities of corresponding management areas due to the lack of need for access, the existence of access, or the exchange of roaded access.

Security

The Sand Hill and Poverty Creek boat ramp access routes would have no measurable influence on elk security due to the lack of change to the open road baseline condition therefore limiting motorized access.

Special Habitat Features

The Sand Hill and Poverty Creek boat ramp access routes, associated parking area and restroom would have no impact on special areas by avoidance and thru consultation with wildlife personnel.

MIS Pileated Woodpecker

The parking area (approximately 2.5 acres), restroom, and Sand Hill and Poverty access routes associated with the proposed boat ramp would not have a measurable impact on PWP habitat because of the limited scope. These facilities and routes may result in the removal of individual snags when considered a safety hazard by OSHA or fall within the routes / turnouts themselves.

OTHER SPECIES OF INTEREST

Goshawk

The Sand Hill and Poverty boat ramp access routes, associated parking area (approximately 2.5 acres), and restroom, would have no impact on goshawks because there is no known nests in this area (mapped). Goshawks could forage in the area depending upon the amount of human disturbance at any given time.

SENSITIVE SPECIES

Eagle

The Sand Hill and Poverty boat ramp access routes, associated parking area (approximately 2.5 acres), and restroom, may impact individual trees and snags but this localized and limited removal should have minimal impacts on eagles based on the amount of available habitat for this species. These actions are greater than ½ mile from any known bald eagle nest site.

Black Back Woodpecker

Additional locations analyzed for the proposed boat ramp include Sand Hill and Poverty Creek. There are no old growth areas mapped for these areas, therefore there would be no impacts on this resource during construction of this facility.

Therefore neither of these proposed locations would impact any mapped old growth that may serve as low-quality BBW habitat.

Fisher

The parking area (approximately 2.5 acres), restroom, and road access routes, Sand Hill (<1 ac) and Poverty Creek (<5 ac), associated with the proposed boat ramp would have no impact on fisher because there is no suitable fisher habitat present in either of these particular areas.

Flammulated OWL

The parking area (approximately 2.5 acres), restroom, and road access routes, Sand Hill (<1 ac) and Poverty Creek (<5ac), associated with the proposed boat ramp may alter some elements of flammulated owl habitat with the removal of individual trees, unsafe snags, or understory roosting habitat, depending on the presence of these elements in the proposed locations. However, the human disturbance associated with these recreation facilities are unlikely to disturb any nesting owls because they are not typically active during the day when most recreation activities occur. The likelihood of disturbance to roosting or nesting flammulated owls is especially unlikely because this species in a cavity nester.

Townsend's Big Eared Bat

The parking area (approximately 2.5 acres), restroom, and road access routes, Sand Hill (<1 ac) and Poverty Creek (<5ac), associated with the proposed boat ramp may result in a minimal loss of trees and snags to accommodate safe operation of vehicles and overall use of the facilities. Due to the anticipated level of snag loss, impacts to the snag capability of the PSU and associated species are considered negligible.

Western Toad

The Sand Hill (<1 ac) and Poverty (<5 ac) boat ramp access routes, associated parking area (approximately 2.5 acres), and restroom may result in a minimal loss of down trees and snags to accommodate safe operation of vehicles. Due to the anticipated level of down wood/snag loss, impacts to the snag capability of the PSU and associated species are considered negligible.

Wolverine

The parking area (approximately 2.5 acres), restroom, and road access routes, Sand Hill (<1 ac) and Poverty Creek (<5ac), are either in areas of existing high human use such as along open road systems or out of wolverine denning habitat, etc. None of the new recreation facilities would impact or reduce wolverine habitat.

Wolf

Because the proposed locations of the boat ramp are within the Koocanusa Reservoir pool area, there would be no impact to the wolf or its prey base. While the parking area and access routes for the proposed boat ramp locations would likely remove some trees and vegetation, a total of 7 acres of disturbance is considered a negligible impact compared to the amount of habitat available to this species and its prey within the PSU.

Grizzly

Recreation

Recreation uses on the KNF is another factor disclosed by the 2011 BO that can affect the ability of grizzly bears to live and reproduce within the CYRZ but may apply to the West Kootenai BORZ. The Young Dodge Project also proposes to create a boat launch, parking area and restroom along Koocanusa Reservoir to accommodate local residents. The proposed locations (Sand Hill, Poverty Creek, Young Bay) for these recreation facilities are expected to measurably influence the amount of recreation use of the Young Dodge project area. The Poverty Creek access route and boat ramp proposed location would require approximately 0.75 miles of road construction within the West Kootenai BORZ. Therefore in order to maintain the existing access conditions with the BORZ and remain compliant with the 2011 BO, 1.93 miles of linear open road will be closed and decommissioned These roads are 7221, 7972D, 7218E, 7213D, and 7211B.

Lynx

Both the Sand Hill and Poverty Creek boat ramp/parking area proposed locations as well as the access routes are outside of lynx habitat and would not involve the alteration of lynx habitat. Therefore implementation of either of these proposed boat ramp locations would have no effect on the lynx.

Recreation

After more recent measurements and comparison of sites, the physical aspects and capabilities of the three sites being compared below vary, but not drastically. One important difference that cannot be changed is the ability of the site to access lower water levels. Both the Sand Hill and Poverty sites have the physical make up for a ramp to be built that could access the low water mark for last six of seven years, Young Creek Bay does not.

In general, all three sites are closer than driving over the bridge to the east side of the reservoir and the wind and wave action is less than that on any of the existing east side boat ramps. Below is a comparison of sites on some additional topics.

Young Creek Bay:

a) Ramp: This site provides the best protection from wind and waves due to it being located in a bay. The drawback of this bay is that its narrow size would limit travel patterns of boats coming into the bay, staging in the bay, and leaving the bay.

b) Current Use: Site provides some type of access to the reservoir. Mooring of boats is currently occurring and would have to be discontinued.

c) Proximity to private land: Young Creek Bay is close to private land which is similar to Sand Hill's location. Although some of the residents may appreciate the shorter distance to a potential ramp, it is not advantageous with regards to recreation management. Conflicts between those recreating and private land owners are dynamic. Placing facilities close to private land is avoided if possible. This would also limit potential for expansion of a campground for example.

d) Proximity to bridge: This site is the farthest from emergency services on the east side of the reservoir as well as being further for someone coming over from the east side to escape the congestion.

e) Access: There is a road in place that leads to the ramp location and parking area. It does need to be reconstructed.

f) Expansion potential: There is some National Forest System land nearby that could facilitate expansion of facilities such as a campground. It is similar in topography to the area around Sand Hill. If a boat ramp was built here there would not be room to build a marina later if one were desired.

Sand Hill:

a) Ramp: Exposure to wind and wave action is greater than at Young Creek Bay and less than Poverty Creek.

b) Current Use: Site provides UTV/ATV access to the reservoir. It has a beautiful beach that is popular and has warranted improving the road to the site in the past and now a vault toilet is to be installed in 2012 with RAC funding. Building a ramp here would displace the current use and send those seeking a similar experience to nearby beaches with access that would not be as good and with an experience affected by the new boat ramp with all its new activity.

c) Proximity to private land: Sand Hill is close to private land which is similar to Young Creek Bay's location. Although some of the residents may appreciate the shorter distance to a potential ramp, it is not advantageous with regards to recreation management. Conflicts between those recreating and private land owners are dynamic. Placing facilities close to private land is avoided if possible. This would also limit potential for expansion of say a campground.

d) Proximity to bridge: This site is the second farthest from emergency services on the east side of the reservoir and also second farthest distance for someone coming over from the east side to escape the congestion.

e) Access: Road is in place to general location.

f) Expansion potential: There is some National Forest System land nearby, similar to that at Young Creek Bay that could facilitate expansion of facilities such as a campground. There would be room for a marina.

Poverty Creek:

a) Ramp: Exposure to wind and wave action is greater than at both Young Creek Bay and Poverty Creek.

b) Current Use: There is currently no road access to this site. The random use the shore receives is currently accessed by boat or foot. A boat ramp built here would provide people with one more access point to the water on the west side of the reservoir.

c) Proximity to private land: This site is not near private land which is beneficial from a management standpoint as well as to those not wanting a ramp and the associated activities.

d) Proximity to bridge: This site has the closest access to emergency services, although they are all remote. It is the closest for someone wishing to escape the congestion of the east side and come over to the west side.

e) Access: No road is in place which would require construction versus reconstruction but this would allow for many options instead of being tied to an already existing facility.

f) Expansion potential: There is a lot of National Forest System land nearby that could facilitate expansion of facilities such as a campground. It would not be beach front, but the rolling topography lends itself to aesthetically pleasing facilities with natural buffers. There would be room for a marina at this site.

Transportation

Existing Condition

Access roads for the Young Bay and Sand Hill sites exist, but no access road exists to the Poverty Creek site. The Sand Hill site is currently accessed by a 12' wide gravel NFS road that was resurfaced in 2010. Portions of Road 7217, 7215 and 7215A are utilized to access a parking area that is 350' x 28'. Young

Bay is accessed by a primitive native surface road, 7176A. No parking area exists at either Young Bay or Poverty Creek.

Direct and Indirect Effects

Management of roads for Sand Hill or Young Bay would not change, the roads are currently open yearlong and would remain open yearlong. Access to a boat ramp at Young Bay would require the reconditioning of .83 miles of roads 7176 and 7176A, and the new gravel surface on .41 miles of road 7176A. Access to a boat ramp at Sand Hill would require 6 turnouts along .28 miles of road 7217, .63 miles of road 7215A and .09 miles of road 7215. These turnouts would be approximately 75 feet long with a 25 foot taper, 12 feet wide. Past activities on these roads have resulted in physical impacts to the transportation system. Some physical impacts include compaction, displacement, rutting, and erosion. Reconditioning and surfacing these roads would protect the resource from further damage.

Access to a boat ramp at Poverty creek will require new road construction of approximately .75 of a mile. This new construction would require clearing and grubbing a corridor approximately 50 feet wide, resulting in a total of 4.55 acres of disturbed ground. The Young Dodge project includes decommissioning of 1.93 miles of open road within the West Kootenai BORZ. This would result in a net decrease of 1.18 miles of total and open road miles.

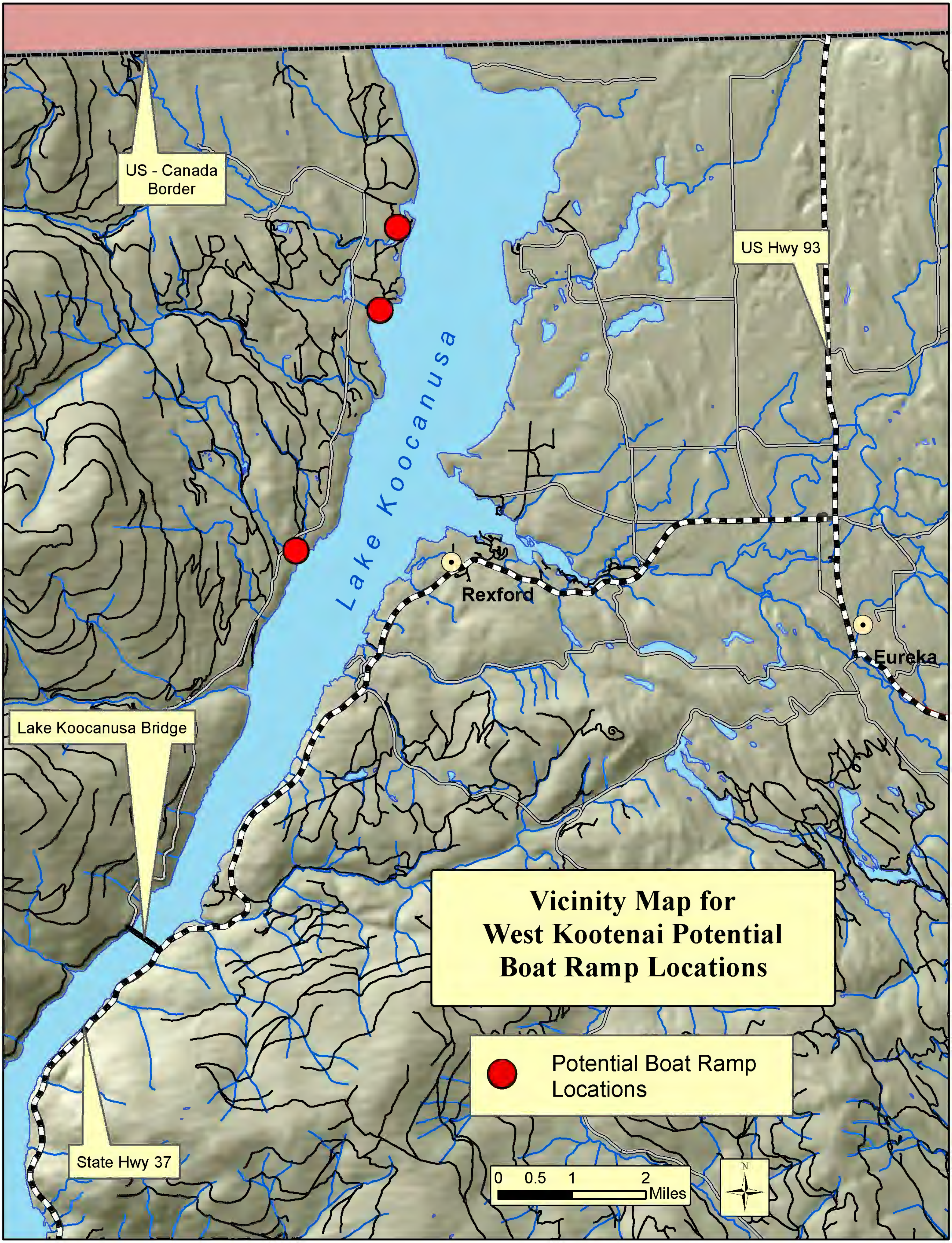
All three sites would require improved parking, which would result in approximately 2.5 acres of disturbed ground to create surfaced lots. Providing surfaced lots would result in a reduction of vehicle traffic off road for parking.

Range

Roads can allow cattle an easier access to the reservoir as a watering site. The only site that would create a new road or access point to the reservoir would be the Poverty Creek site. Cattle are only allowed in the pasture in this area from May 15 to July 1. Cattle are not typically found near the reservoir. If cattle/human interactions at the boat launch site were to occur, a cattle guard would have to be installed.

Cultural Resources

An archaeological survey of the land above the reservoir was completed for the Kootenai Junction Timber Sale (project report 01-KO-1-02.) The majority of the land within the reservoir was completed for the Army Corps of Engineers in 1983 (project report 84-KO-1/6-09.) No cultural resources within the area of effect were located in either survey. However, due to the extensive ground disturbing activities that may occur, the area would be resurveyed when the exact location of the boat ramp is determined.


US - Canada Border
US Hwy 93
Lake Koocanusa
Rexford
Eureka
Lake Koocanusa Bridge
State Hwy 37
Vicinity Map for West Kootenai Potential Boat Ramp Locations
Potential Boat Ramp Locations
0 0.5 1 2
Miles
N

West Kootenai Potential
Boat Ramp Locations
Young Bay Site
Sand Hill Site
Poverty Creek Site
Lake Koocanusa
Young Creek
Dodge Creek
Poverty Creek
N
0 0.25 0.5 1
Miles